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BULLETIN

OF THE

TORREY BOTANICAL CLUB.

VOL. XIII. — XIV

Founded by William H. Leggett, 1870.

Bo'd by W. 7.
for $1.00, - 2/1/89.

NEW YORK:
1886.

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GENERAL INDEX.

(Illustrated articles are designated by an asterisk* before the page number.)

Aconitum noveboracense, Gray, n. sp., 190.
Algæ, check list of marine, 105.
Anychia, notes on the species of the genus, 185.
Bauhinia cretacea, Newberry, n. sp., *77.
Botany at the Buffalo meeting of the A. A. A. S., 169.
Botanical Literature, index to recent American, 7, 29, 41, 63, 85, 95, 123, 146, 173, 192, 222, 247.
Botanical Notes, 15, 31, 47, 67, 87, 100, 126, 151, 180, 195, 226, 252.
Botanical Notes in Virginia and the Southern Alleghanies, 69.
Botanists of the A. A. A. S., a letter from Commissioner Colman to the, 228
Buxbaumia aphylla, time of fruiting of, 244.

CONTRIBUTORS:
  Bailey, W. W., 61, 62, 101.
  Best, G. N., 121. 245.
  Britton, E. G., 7, 69, *95.
  Britton, N. L., 6, 41, 84, 89, 185, 205.
  Campbell, D. H., 49, 93.
  Claypole. E. W., 187, 191.
  Coville, F. V., 190.
  Davenport, G. E., 81, 129.
  Davis. W. T., 229.
  Day, E. H., *62, 94.
  Dudley, P. H., 91, 122.
  Foerste, A. F., *39.
  Gratacap, L. P., 188.
  Gray, Asa, 1, 101.
  Greene, E. L., 61, 141, 216.
  Gregory, Emily L., *197, *233.
  Hart, John. 101.
  Hollick, Arthur, 84.
  Lighthipe, L. H., 4.
  Merrill, F. J. H., 6.
  Morong, Thomas, 145, *153.
  Nealley, G. C., 247.
  Newberry, J. S., 38, *77, 183.
  Pammel, L. H., *17.
  Pike, Nicolas, 105.
  Plowright, Charles B., 127.
  Rau, E. A., 120.
  Redfield, J. H., 220, 232, 245.
  Safford, W. E., 114, 244.
  Sargent, C. S., 78.
  Seaman, Wm. H., 145.
  Schrenk, Joseph, 38, 68, 169.
  Scribner, F. L., 181.
  Trelease, William, 135.
  Vasey, George, 25, 29, 52, 118, 162, *219. 229.
  Wibbe, J. H., 39.
  Willis, O. R., 246.
  Wolle, Francis, 56.

Corema localities, still further notes upon, 220.
Cyperi, preliminary list of North American species of, 205.
Dendrological Notes, 78.
Desmids of the United States, Turner's new, 56.
Dicotyledons, nomenclature of leaves of fossil, 38.
Duct formation in chestnut wood, 91.
Erica and Calluna on Nantucket, 246.
Euphrasia officinalis, 232.
Fern Notes, 81, *129.
Fern Sporangia, the dehiscence of, 168.
Ferns, development of the antheridia in, *49.
Flora of the Amboy clays, fossil, 33.
Flora of the Hudson Highlands, notes on, 60.
Flora of New Jersey, notes on, 4.
Flora of Richmond county, N. Y., 83.
Flora of Ross county, Ohio, 114.
Flora of Westchester county, N. Y., additions to, 6, 94.
Floras, insular, 245.
Grasses, new American, 25, 52, 118.
Grasses, new species of Mexican, 229.
Grasses, a new genus of, *219.
Hydrocotyle Americana, tuberiferous, 28.
Juncus Greenii, southern range of, 5.
Libriform tissue, the pores of, *197, *233.
Marsilea quadrifolia, notes on, 144.
Moss, a new, from Oregon, 120.
Myosurus, revision of, 1.
Myosurus, a word concerning, 61.
Naiadaceæ in the Torrey Herbarium, *153.
Notes from the Saguenay River, 188.
Notes from Schenectady, 39.
Orange leaf scab, notes on the, 181.
Orcuttia Californica, Vasey, n. sp., *219.
Orthotrichum Pringlei, C. Mull, n. sp., 120.
Osmunda cinnamomea, var. frondosa, *62.
Paspalum, synopsis of the genus, 162.
Peronospora infestans, the mode of destruction of the potato by, 191.
Pine-seed Wings, examination of, 245.
Pinus pungens in New Jersey, 121.
Pinus monophylla and Pinus edulis, 183.
Plants of the Detroit River, 93.
Plants, introduced, Summit county, Ohio. 157.
Plants, rarer, of the valley of the Hudson, 6.
Platanus occidentalis. 247.
Polypetalae, some Californian, 141, 216.
Populus grandidentata, leaf forms of, *89.
Potamogeton Curtisii, Morong, n. sp., 145.
Potamogeton Wrightii, Morong, n. sp., *158.
Potato, a curious, *39.
Proceedings of the Club, 16, 32, 48, 88, 104, 128, 226. 252.
Quercus alba, plurality of embryos in, *95.
Quercus Muhlenbergii, note on, 40.
Seeds, Leguminous, structure of the testa of several, *17.
Starch in the wood of chestnut, notes on, 122.
Union of an oak with a birch, 221.
Veltheimia, proterandry in, 62.
Yucca, nectary of, *135.

ERRATA, VOLUME XIII.

Page 79, line 30, for Andrews' Bold, read Andrew's Bald.
" 80, " 32, " Cousin's Head, " Cæsar's Head.
" 82, " 30, " specimens, " species.
" 123, " 4, " media, " medium.
" 128, " 6, " address, " 7 King street, King's Lynn, Eng.
" 135, " 22, " 445, " 455.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XIII.] New York, January, 1886. [No. 1.

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Notes on Myosurus.

BY ASA GRAY.

It has come in my way to take up the genus *Myosurus*. My preliminary study leaves some points in doubt, which may be settled by the additional materials and observations which the following remarks are designed to solicit.

M. MINIMUS, L.—Down to recent times this was the only recognized species, for *M. Shortii*, Raf., is clearly understood to be identical with the Linnean species.* Some authors have regarded our *M. minimus* as an introduction from Europe. I have never seen it growing, and therefore cannot form a judgment on personal observation. It is not known in the Northern Atlantic States east of the Alleghanies. In Elliott's time it was known in the Southern Atlantic States, by a station at Augusta, Georgia: but from Kentucky, Tennessee, and Texas it extends so far westward that we can hardly suppose it to have been an European importation. But a good many far-western specimens which have been referred to it belong to another species. If indigenous, it is one of those plants which are common to Europe and America, but not to Asia. The opinion that it is truly indigenous to America is much strengthened by the fact that this country possesses all the other species. In a very recent *Revision of Myosurus* by Mr. Greene, in Bull. Calif. Acad., i., 276-279, two varieties of *M. minimus* are described. The first, var. *apus*, is said to have the scapes only a line or two long, and it was collected by Mr. Orcutt back of San Diego. Mr. Cleveland sends us from the same habitat fruiting specimens with scapes

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*Our specimens of No. 3 of Drummond's Coll. from New Orleans, distributed by Sir Wm. Hooker, are truly this plant, although Mr. Greene, in Bull. Calif. Acad., i, 278, mentions that what he has from this source is *Plantago pusilla*.

from a quarter to a full half-inch long, which very well match a similar form in Todaro's Flora Sicula Exsiccata. His var. *filiformis* needs further investigation of mature specimens of its various forms. Some of the specimens referred to it may belong to a variety of the next species, but not the Guadaloupe plant nor that of Rusby from Arizona.

M. APETALUS, Gay.—(Fl. Chil., i., 31, t. 1, fig. 1.) It will be seen that this older name should be restored. When Mr. Bentham sent his name and account of *M. aristatus* to Sir Wm. Hooker, the latter recognized the identity of Geyer's with Gay's Chilian plant; but, finding petals, discarded the latter's name as a false one. Sir Joseph Hooker in the New Zealand Flora, followed his father, although stating that the specimens are apetalous. And Bentham says the same of the Australian plant, which he refers to *M. minimus*, the *M. australis* of Mueller, which probably belongs to the following variety of the present species; but my specimens are too young to prove it. I am convinced that the beak, which suggested Bentham's name, is fallacious as a character, and that a series may be arranged from the longest beaked forms to those which are as beakless as *M. minimus* often, but not always, is. Consequently, if the name *apetalus* may be rejected because the species is often petaliferous, so may that of *aristatus*, because the arista or beak is often wanting. Since the latter name must subside, we need not insist that the name, as well as the character, was published as Bentham's. So that the latter's incidental mention of it, sixteen years later, as "*M. aristatus*, Geyer," whether by mistake or intention, can hardly require Mr. Greene to cite the published name as of Geyer.

Var. LEPTURUS.—I give this name to a series of specimens which have generally been referred to *M. minimus* on account of having as short a beak or tip as has the akene of that species, but in which the akenes are oblong, narrower, and more carinate on the back, and the body thinner walled and more utricular, and the seed oblong, as in ordinary *M. apetalus*, in this even elongated-oblong. The best fruiting specimens I possess are those of Lemmon from California (No. 1 of Coll., 1874), and of the Howell's from N. E. Oregon (No. 38 of Coll., 1882). Hartweg's No. 1629, from the Sacramento Valley, Macoun's No. 50, from Vancouver's

Island in 1875, and even Parry's No. 11 of his Wyoming expedition, may belong here, but are not in fruit. Yet they may have broader akenes and oval seeds, which would identify them with Greene's *M. minimus* var. *filiformis*, of which, as I have said, more mature specimens are much wanted. The very depauperate specimens from Antioch, Cal., are certainly of this variety of *M. apetalus.* Suksdorf's No. 492, Coll. 1885, from the Columbia River, is quite intermediate between undoubted *M. apetalus* and this var. *lepturus.*

M. SESSILIS, Watson, (Proc. Am. Acad., xvii., 363), with carpel-spikes even at maturity perfectly sessile at the root, oval akenes, with acutely carinate back continued into a beak, and short oval seeds, must be a good species, known as yet only in Howell's specimens (No. 383 of 1882), from alkaline flats of N. E. Oregon.

M. CUPULATUS, Watson, l. c., is most distinct. Its small akenes thicken on the sides and round the back with a corky or coriaceous growth of whitish color, the upper edge of which forms a rim or shallow cup around the base of the green and gladiate-subulate beak; the proper cell is small, thin-walled, and filled by the oval seed.

M. ALOPECUROIDES, Greene (in Bull. Calif. Acad., i, 278), the latest-published species, appears to be a good one; but more mature fruit is desirable. It comes between *M. apetalus* and *M. cupulatus*, yet with the general shape of the akenes more like that of M. *minimus.* It is characterized by the development of a soft-cellular border around the oblong back of the akene, which thus becomes concave, and the conspicuous beak is laterally flattened, as in *M. cupulatus*, but is narrower. The short spur of the sepals may not be trusted, for this is nearly wanting in some flowers of *M. apetalus.*

The fruit of *Myosurus* is said to be an akene; it might as well be called an utricle, or even a follicle. For in all the species, though least in *M. minimus*, the ventral portion or proper body of the mature carpel is soft-cellular or thin, and more or less scarious, and the ventral suture very commonly dehisces when the carpels fall from the receptacle.

A word upon the authorship of the genus. Linnæus, as his manner is, writes "*Myosurus*, Dill." So, also, do Endlicher, Jussieu (except that he goes further back), De Candolle, Torrey and Gray, etc., etc. All this Mr. Greene must have overlooked, when, in his revision of *Myosurus*, he reclaimed this genus for Dillenius in a special foot-note, and supposed that he stood alone. The practice of recognizing the genera of Tournefort, Dillenius, and the like (when adopted by Linnæus, or subsequently taken up) is general, though not universal. Nevertheless one can understand and appreciate the reasons which governed the authors of the last Genera Plantarum, when they decided not to go back of Linnæus. Yet we prefer to follow a fairly established rule—to follow, indeed, the practice of Linnæus himself.

I add a key to the species of *Myosurus* so far as I now know them.

* Mature carpels with back carinate from base to apex, not suberose nor cellular thickened.

† Scapose.

M. APETALUS, Gay.—Mature carpels oblong, thin-walled, with narrow prominently carinate back, prolonged into an ascending or loose beak ; seed oblong.

Var. LEPTURUS.—Slender-spiked ; carpels less carinate on the broader back ; beak short and erect or obsolete ; seed elongated-oblong.

M. MINIMUS, L.—Mature carpels somewhat quadrate, broad-backed ; seed oval.

† † Scape none, even in fruit.

M. SESSILIS, Watson.—Carpels of the thickish spikes oval, more scarious-utricular, with narrow salient keel prolonged into a subulate beak ; seed short, oval.

* * Mature carpels with cellular or suberose thickening around the salient and laterally flattened-beaked keel.

M. ALOPECUROIDES, Greene.—Short-scaped spikes thickish ; oblong back of akenes with a soft-cellular border and barely concave, the body wholly scarious-cellular ; seed oblong-oval.

M. CUPULATUS, Watson.—Slender-scapose and slender-spiked ; mature akenes roundish, with corky or cartilaginous thickening of back and sides, forming a cupulate border around the triangular-subulate, much compressed beak ; seed oval.

Notes on the New Jersey Flora.

BY L. H. LIGHTHIPE.

At Rocky Hill, Somerset Co., N. J., I collected *Staphylea trifolia*, L.; *Orchis spectabilis*, L.; *Obolaria Virginica*, L.; *Paulownia imperialis*, Sieb. and Zucc. This last has escaped from cultivation and is growing among the rocks along the west bank of the Millstone River. There are about a dozen trees, six or seven years old, in the woods, over a quarter of a mile from trees in cultivation, or from the nearest house.

At Woodbridge, Middlesex Co.: *Aquilegia vulgaris*, L.; *Ranunculus ambigens*, Watson; *Ammannia humilis*, Michx.; *Cuphea viscosissima*, Jacq.; *Centaurea nigra*, L.; *Datura Tatula*, L.: *Sabbatia stellaris*, Pursh., white flowers; *Gerardia purpurea*, L., white flowers; *Brunella vulgaris*, Tourn., white flowers; *Gerardia auriculata*, Michx., (the only known locality in New Jersey.)

At Sand Hills, three miles from Woodbridge, on the north side of the Raritan River: *Cypripedium acaule*, L.; *Lycopodium dendroideum*, Michx.; *Tephrosia Virginiana*, Pers.; *Magnolia glauca*, L.; *Andromeda Mariana*, L; *Calopogon pulchellus*, R. Br.; *Arethusa bulbosa*, L.; *Pogonia ophioglossoides*, Nutt.; *Drosera rotundifolia*, L.; *Drosera longifolia*, L.; *Kalmia angustifolia*, L.; *Leucothoe racemosa*, Gray; *Epigæa repens*, L.; *Azalea viscosa*, L.; *Gerardia pedicularia*, L.; *Lonicera sempervirens*, Ait.; *Polygonum tenue*, Michx.; *Polygala cruciata*, L.; *Habenaria blephariglottis*, Hook.; *Eupatorium rotundifolium*, L.; *Eupatorium teucrifolium*, Willd.; *Euphorbia Ipecacuanhæ*, L.; *Aster linariifolius*, Hook.; *Chrysopsis Mariana*, Nutt.; *Pinus inops*, Ait. Many of these are peculiar to the Yellow Drift formation, of which this is, I believe, the extreme northern limit in Eastern New Jersey.

Near Spring Lake, Monmouth Co.: *Polygala polygama*, Walt.; *Limosella aquatica*, L.; var. *tenuifolia*, Hoffm.; *Aletris farinosa*, L; *Monotropa Hypopitys*, L.

Near Bay Head, Ocean Co.: *Liatris spicata*, Willd.; *Limosella aquatica*, L.; var. *tenuifolia*, Hoffm.; *Utricularia gibba*, L.

At Perth Amboy: *Liatris spicata*, Willd.

Southern Range of Juncus Greenii, Oakes and Tuck.

In the last edition of Gray's Manual of Botany this plant is credited to the "sandy coast of New England and on the Great Lakes near Detroit." It extends much farther southward, however, along the Atlantic coast. In the State Flora of New York it was doubtfully credited to Long Island, but its presence in Suffolk County was later confirmed by Messrs. E. S. Miller and H. W. Young.* It was collected some years ago by Mr. W. H. Leggett near Rossville, Staten Island,† and in July of last year I found it growing abundantly on the yellow drift along the southern shore of the Raritan River near Sayreville, Middlesex Co., N. J., and on Sandy Hook. It seems to replace *J. dichotomus*, Ell., of southern New Jersey in the northward extension of the Pine Barren Flora.

N. L. BRITTON.

Note on Some Rarer Plants of the Valley of the Hudson.

At Verplanck's Point, near Cruger's Station on the Hudson River Railroad, are fine bluffs of palæozoic limestone. Among plants noticed there are *Campanula rotundifolia*, L. ; *Anemone dichotoma*, L. ; *Thuja occidentalis*, L. ; *Arenaria Michauxii*, Watson ; *Viburnum pubescens*, Pursh. ; *Arabis lyrata*, L. ; *Taxus baccata*, L., var. *Canadensis*, Gray ; *Verbena angustifolia*, Michx. ; *Potentilla argentea*, L. These were all picked up in little over an hour. The locality is worth careful examination.

On the crystalline rocks along the west side of the Hudson were noticed *Adlumia cirrhosa*, Raf., above Jones' Point ; *Viburnum pubescens*, Pursh. ; *Neillia opulifolia*, B. & H., and *Corydalis flavula*, Raf., at West Point ; *Acer Pennsylvanicum*, L., Crow's Nest Mountain ; *Polygonum cilinode*, Michx., and *Adlumia cirrhosa*, Raf., below Cornwall ; *Celtis occidentalis*, L., Tompkins' Cove.

Along a roadside west of Cornwall, *Stellaria graminea* was growing abundantly.

F. J. H. MERRILL.

Additions to the Westchester County Flora.

The following are additions to the Flora of Westchester Co., N. Y., not reported in the Willis Catalogue ; *Ranunculus pusillus*, Poir., Pelhamville ; *Viola pubesceus*, Ait., double-flowered, Pelham Manor ; *Artemisia caudata*, Michx., Premium Pt., New Rochelle;

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*Cat. Plants Suffolk Co., 1874, p. 13.

† See Bulletin, iv., 24.

Callitriche heterophylla, Pursh., Upper New Rochelle, collected by Prof. E. H. Day; *Osmunda cinnamomea*, L.; var. *frondosa*, Gray, and *Equisetum sylvaticum*, L., collected at Pelhamville by E. G. Knight. From Yonkers, N. Y., collected by E. C. Howe, are reported *Centaurea nigra*, L. (BULLETIN, v. 52, vi. 56), and *Rumex orbiculatus*, Gray. E. G. B.

Index to Recent American Botanical Literature.

Amaryllis Treatiæ. Mrs. Fanny E. Briggs. (Gard. Month. xxviii., (1886), pp. 23-24.)

Botanical Necrology of 1885. Asa Gray. (Am. Journ. Sci., xxxi., pp. 12-22.)

The death of Charles Wright on the 11th of August, and of George W. Clinton on the 7th of September, have called forth an interesting account of their work in American Botany, which Dr. Gray, from personal acquaintance and correspondence, is so well able to give. The frequent and varied botanical excursions of Charles Wright in Texas, Arizona, and New Mexico, his connection with the Ringgold-Rogers North Pacific Exploring Expedition, and his numerous explorations in Cuba, extending over a period of nine years, enabled him to make collections which are scattered through all the large Herbaria of the United States and Europe, and have provided material for publications of great value to North American botanists. But two of these appear in his own name. George W. Clinton's botanical work, beginning with three years' scientific studies as a young man, and renewed after an interval of thirty-two years devoted to law, resulted in the Clinton Herbarium for the Buffalo Society of Natural Sciences, and a Catalogue of the Native and Naturalized Plants of the City of Buffalo and its vicinity. Dr. Gray also gives a very interesting account of Edmond Boissier and Johannes August Christian Roeper.

Cercosporæ—Supplementary Enumeration of the. J. B. Ellis and B. M. Everhart (Journ. Mycol., ii., (1886), pp. 1-2.) Eight additional species to the ten already described in the same journal are given; six of them are new.

Cimicifuga racemosa, Nutt. C. G. Lloyd. (Drugs and Medicines of North America, i., (1885), pp. 244-272. Four plates, 17 figures.)

Part 8 is on the same extensive scale as the preceding ones, containing eleven pages of botanical description of the above and allied species, with a map showing the geographical distribution. We note the omission of any localities on Staten Island and Long Island, though it grows abundantly on the morainal hills in each, and Connecticut is also left blank on the map, though the text reports the plant as found there.

The portion describing the microscopic structure was prepared by Louisa Reed Stowell, and is illustrated by cross sections of the root and rhizome, with drawings of the starch grains found in the latter. It is to be regretted that the dimensions are not given in micromillemeters. Chemical constituents and analyses with the history in the Pharmacopœia complete the number. At the present rate of progress Messrs. Lloyd will require long lives to complete the series.

Coca.—The Cultivation of. Dr. Henry H. Rusby. (Therapeutic Gazette, x. (1886) pp. 14-18.)

Dr. Rusby has been engaged for several months in the study of the coca-plant (*Erythroxylon coca,*) in the mountains of Bolivia, and mainly in the district of Yungas, which contains the principal coca districts of the Republic These are situated to the east of La Paz, on the eastern side of the easternmost cordillera of the Andes, which here has an average elevation of about 16,000 feet, and is always more or less snow-covered. He gives a brief description of the flora of the region, from which we extract the following:

Descending this slope, which is extremely steep, the first coca plantations are met at an altitude of about 6,400 feet, and occur down to the 2,000 foot level. The flora of the summit of the cordillera is low and mat-like. A little lower Dr. Rusby met with some *Gentianaceæ,* among them one which he suggests may be the same as *Halenia Rothrockii*, Gray, of Arizona, accompanied by shrubby *Acanthaceæ* and *Bignoniaceæ.* At 9,000 feet orchids and *Calceolarias* begin with arborescent *Mel-*

astomaceæ ; at 8,000 feet the first tree ferns are met, the timber trees become quite large and *Begonias* make their appearance. "From this point the vegetation begins to assume a really tropical aspect. We find many species of *Calceolaria*, *Fuchsia* and *Amaryllidaceæ*, while the variety of orchids and ferns is quite bewildering. At 6,500 feet we see the first palms, and the forest trees become buttressed giants, staggering under their loads of vines, and climbing aroids and ferns, and their branches covered with *Bromeliaceæ* and orchids."

Among the cultivated plants of the coca-districts, Dr. Rusby mentions coffee, rice, sugar cane, tobacco, maize, cotton, sweet potatoes and the ordinary garden vegetables. Of fruits, there are oranges, bananas, cocoanuts, lemons, citrons, grapes, pomegranates, figs, melons, pineapples, and several others peculiar to the region. He is of the opinion that the coca is adapted for culture in many countries, and suggests Guatemala, Mexico, the East and West Indies, India, and possibly southern Italy. Jamaica presents especially promising conditions. It is doubtful if it would grow in any portion of the United States. Several years since a small quantity of seeds were successfully germinated in Ceylon, and during the past season the first products were sold in London at a high price.

Council Tree of the Senecas at Geneva, N. Y. (Gard. Month., xxviii., (1886), pp. 49-51.)

The Editor of the Gardener's Monthly gives an interesting account of this noble elm, part of which is yet standing on the Old Castle farm, owned by the heirs of Mr. Jerome Lewis. It is, in fact, a double tree, the two parts branching just above the ground. Measurements made on August 21, 1879, gave the following: trunk, just above the ground, but near the crown of the roots, 25 feet; two feet above the last measurement, or about three feet above the ground, 21 feet, 3 inches; trunk of west branch, 13 feet, 6 inches; east branch, 15 feet, 2 inches, the last two measurements being five feet from the ground. Under the eastern edge of the tree is a large stone, deeply imbedded in the ground; this has a hollow scooped out towards one end, and was probably used by the Indians for pounding corn in, and is in the same place where it was used and left by them. A cut taken from a photograph accompanies Mr. Meehan's description. One of the large branches, comprising about one-half of the tree, was blown off in a gale of wind, September 14, 1882, so that the elm has now lost its grandeur and beauty.

Conspectus Hepaticarum Subordinum, Tribuum et Subtribuum. R. Spruce. (Trans. & Proc. Bot. Soc., Edinburgh, xv., pp. 309-588. Plates V-XXII.)

This is the second part of the Memoir on the Hepaticæ of the Amazon and of the Andes of Peru and Ecuador, and contains the *Jungermanieæ* of sub-order I., and sub-orders II., III., and IV., *Marchantiaceæ*, *Ricciaceæ*, and *Anthocerotaceæ*, including 46 genera, comprising full descriptions of every species, with their characters, habits, and distribution in equatorial America. The author states that he has been prevented by illness from completing the Introduction which he had intended to issue with this part, hence he hopes to be able to present it as a Supplement to the work, including additional matter on the hepatic vegetation and the bearing thereon of the principal features of the region explored, with some critical remarks on certain of the genera and species.

Curtis, Rev. Moses Ashley.—A Sketch of the Botanical Work of. Thomas F. Wood. (Journ. Elisha Mitchell Scientific Soc., 1884-'85, pp. 9-31.)

Cuscuta.—Notes on. E. J. Wilkson (Trans. San Francisco Mic. Soc., Dec. 9th, 1885.)

Dandelion.—A Study of the. E. Lewis Sturtevant. (Am. Nat., xx., (1886), pp. 5-9.

A valuable contribution to the literature of this plant, giving the common names in eleven languages, citing authorities dating back to 1539 and 1583 for descriptions of varieties, and tracing the history of its use and cultivation as a salad in England, France and the United States. From observations conducted at the New York Agricultural Experiment Station at Geneva the author describes a dozen different form-species, figures 6 leaf-forms, and inclines to the conclusion that they are of natural origin. "Before, however, such a radical belief can receive countenance, much must be done in the herbarium study of varieties collected from various sources, in order that we may have wild forms to which our cultivated types can be referred. Our so-called modern vegetables, introduced as novelties, often seem to be such only because we are unfamiliar with what our predecessors possessed."

Fungi.—New Kansas. J. B. Ellis and W. A. Kellerman. (Journ. Mycol., ii., pp. 3-4.) Eight new species are characterized.

Fissidens.—Notes on the European and North American Species of Mosses of the Genus. William Mitten, A.L.S. (Journ. Linn. Soc., xxi., pp. 550-560.)

Three pages of introductory remarks and references, followed by the analytical key, precede the specific descriptions. Of these there are in all thirty-nine. The key is sub-divided into: I. Forms terrestrial; II. Forms aquatic; and in the latter he restores *Conomitrium Julianum*, Mont., and *C. Hallianum*, Sull. and Lesq., to the genus *Fissidens.* "This survey is rendered possible by the recent publication of Braithwaite's British Moss Flora, and the Manual of North American Mosses."

Flora of Virginia.—Contributions to the Knowledge of the older Mesozoic. William Morris Fontaine. (Monographs U. S. Geol. Survey, vi., pp. 144, 54 plates.)

An account of the geology of the mesozoic areas, forming part I. of the work, precedes the account of the fossil flora. 47 species of plants are there described, and nearly all figured. These are divided as follows: *Equisetæ*, 5 species; Ferns, 25 species; Cycads, 12 species, and the fruit of a thirteenth; *Coniferæ*, 2 species, and three plants whose botanical affinities are doubtful. From his investigations of these plants Professor Fontaine concludes that the flora is not older than that of the Rhætic beds of the Old World, which are at the very summit of the triassic system, or the base of the jurassic. It is essentially the same as that of the mesozoic strata of North Carolina, an account of which, taken from the work of Dr. Emmons, is appended, with descriptions and figures of plants recorded by him in "American Geology," Part IV.

Jamaica Ferns of Sloane's Herbarium.—On the. G. S. Jenman, F. L. S. (Journ. of Bot., xxiv., (1886), pp. 14-17, to be continued.)

They comprise Vol. I. of Sloane's Natural History of Jamaica, which, though two hundred years old, contains several rare and only recently re-discovered species. The numbers run to one hundred and three, but these include a few flowering plants which he thought to be allied to ferns. Most of the specimens are in excellent condition. Sloane's collections in Jamaica and adjacent islands extended over a period of fifteen months and formed the foundation of the immense collections which he bequeathed to the British Museum. His classification of ferns and the synonyms used are superseded, but the author derived much benefit by studying these old types.

Layia glandulosa, Hook. and Arn. (Curtis's Bot. Mag., xlii., Tab. 6856. The specimen figured flowered at Kew in the open border, July, 1885.

Martha's Vineyard and Nantucket—On the Flora of. J. H. Redfield. (Proc. Acad. Nat. Sci., Phila., (1885), pp. 378-379.)

The northern portion of the Island of Martha's Vineyard rises into rounded hills of considerable elevation, composed of gravelly drift, strewn occasionally with large boulders. The more central portion consists of level plains of gravel covered with oaks, mostly *Quercus obtusiloba.* The general character of the flora is much like that found on the summits of the divides in southern New Jersey, though much more limited as to species. In Nantucket he had found the gravelly hills of much less height, the greater portion of the island consisting, in fact, of treeless plains. The most characteristic plant of these plains seemed to be *Arctostaphylos Uva-ursi.* The two species of *Hudsonia* abound, as do *Polygala polygama*, *Myrica cerifera*, and various *Vaccineæ.* He saw many large patches of *Corema Conradii.* But the most interesting feature is the existence here of three species of heath, possibly indigenous. Mrs. Owen, who published a preliminary catalogue of the Nantucket flora a few years ago, records *Calluna vulgaris* and *Erica cinerea* as found upon the island. Mr. Redfield did not see the locality of *Calluna*, but had the privilege of seeing that of *Erica cinerea.* This plant covers only an area of eight inches by ten, and has been known for a space of ten or twelve years. Since his visit the third species, *Erica tetralix*, had been discovered in a locality very distant from that of *E. cinerea.* There are said to be seven or eight plants, all thriving, large and bushy.

Mertensia Virginica, D. C.

In the *Garden* for Dec. 26, 1885, p. 654, will be found directions for cultivating this charming plant, and a beautifully colored plate accompanies the number.

Mistletoe in various Localities.

In the *Gardener's Monthly and Horticulturist* for January, 1886, (Vol. xxviii., pp. 24, 25.), a number of notes from correspondents give the host plant of *Phoradendron* in widely separated localities. About Savannah, Mr. C. A. Oelschig reports it as most abundant on oaks, especially the water-oak, but had observed the parasite on pear-trees, and in a single instance on *Olea fragrans.* Mr. S. T. Walker says it is found exclusively on the oaks in Oregon. Mr. D. S. Watson notes that in Texas the mistletoe appears to have no choice, growing on almost any kind of tree. In western Texas it is particularly abundant on the mesquite and hackberry. In the vicinity of Hammonton, New Jersey, Mr. F. L. Bassett finds it mainly on *Nyssa multiflora ;* he notes a single infested tree of the red maple. Another correspondent tells how he found it on the red oak near Fredericksburg, Virginia, in 1863.

My New Jersey experience with the mistletoe agrees with Mr. Bassett's report. I have seen it repeatedly on the *Nyssa*, and have the best authority for its presence on the red maple, in but two instances, however.

For additional information on *Phoradendron* see this journal, iii., p. 26 ; iv., pp. 12, 13 ; vi., pp. 64, 147, 235 ; xi., pp. 76, 87.

N. L. B.

North Carolina Plants.—A Preliminary List of Additions to Curtis' Catalogue of. M. E. Hyams.

Ninety-three additional species are reported, without localities. Errors of spelling are inexcusably numerous. (Journal Elisha Mitchell Scientific Soc., 1884-'85, pp. 74-76.)

Northern Pacific Railroad.—Notes on the Geology and Botany of the Country bordering the. Prof. J. S. Newberry. (Ann. N. Y. Acad. Sci., iii., (1884) pp. 242-270.)

The botanical parts of this interesting paper are: (1) A brief description of the forests of the Rocky Mountains. (2) Those of the Cascade Mountains, and the flora of the Lower Columbia.

Polyporus.—Notes on. J. B. Ellis. (Journal Mycol., ii., pp. 5, 6.)

Rosa pisocarpa, Gray. (Curtis' Bot. Mag. xlii., Tab. 6857.)

The Kew plants were raised from seed received from Prof. Sargent; they flowered in July and fruited in September.

Sassafras.—Large trees of. Dr. Gordon W. Russell (Gard. Month., xxviii, (1886) p. 22.)

West of Bridgport, Conn., G. L. Porter measured a tree having a circumference of 78 inches, 4 feet above the ground; and reports another having a circumference of 110 inches at 5½ feet above the ground.

Tendril Movements in Cucurbita Maxima and C. Pepo. D. P. Penhallow. (Am. Journ. Sci., xxxi., pp. 46-57, Pl. V.; to be continued.)

Recent discoveries on the continuity of protoplasm have thrown more light on some studies made by the author in 1874, of the movements of the tendrils and terminal bud of the squash. After giving careful explanation of the methods pursued in growing and recording the movements, as shown by diagrams, he proceeds to explain the histology of the tendril. Three important areas were noted, running the length of the tendril, each in a depression which is noticeably greener than the rest of the tendril. To these areas the name *Vibrogen* tissue has been given, as it is to these the origin of movements are due. The subsequent movements are fully explained and torsion has been observed, contrary to statements of Sachs. The continuity of protoplasm was demonstrated most clearly in the collenchyma, of which a most satisfactory drawing will be found. The movements which bring about the formation of the double spiral are described at length and full measurements given.

Teucrium Canadense.—Fertilization of. Aug. F. Foerste, (Am. Nat., XX., p. 66.)

Transpiration—Some Notes on Plant. F. P. Venable. (Journal Elisha Mitchell Scientific Soc., 1884-'85, pp. 63-66.)

Botanical Notes.

Poppies on Railway Embankments. The horticulturists who do so much to render summer railway travel agreeable in the more settled parts of the country by their ingenuity and taste, in decorating the grounds about the stations, my perhaps be interested to know that in the opinion of M. Cambier, chief roadmaster of the French Government railways, the best plant yet discovered for consolidating, by the interlacing of its roots, the loose soil of a newly made embankment is the double poppy. Ten years' trial has enabled M. Cambier, as he says, to guarantee that the poppy will be found far more efficient for this purpose than any of the grasses or clovers usually employed; and while these require several months for the development of their comparatively feeble roots, the double poppy germinates in a few days, and in two weeks grows enough to give some protection to the slope, while at the end of three or four months the roots, which are ten or twelve inches long, are found to have interlaced so as to retain the earth far more firmly than those of any grass or grain. Although the plant is an annual, it sows itself after the first year, and with a little care the bank is always in good condition. In France the double poppy is perfectly hardy, and can be sown at almost any time from March to November. With us it is also said to be quite hardy, and a long embankment covered through the later summer and autumn with the dazzling scarlet blossoms contrasted with green grass at the foot of the slope, would have a most striking effect.—*American Architect.*

Specimens of Cuscuta wanted. Prof. C. E. Bessey, of the University of Nebraska, Lincoln, Neb., desires to obtain by exchange or purchase, specimens of *Cuscutæ* in flower or fruit.

Queer Books in a German Library. One of the most curiously original collection of books in any library is said to be a botanical collection at Warsenstein, in Germany. At first sight the volumns appear like rough blocks of wood; but on closer examination it is found that each is a complete history of the particular tree which it represents. At the back of the book the bark has been removed from a space large enough to admit the scientific and the common name of the tree as a title. One side is formed from the split wood of the tree, showing its grain and natural fracture; the other shows the wood when worked smooth and varnished. One end shows the grain as left by the saw, and the other the finely polished wood. On opening the book one finds the fruit, seeds, leaves, and other products of the tree, the moss which usually grows upon its trunk, and the insects which feed upon the various parts of the tree. To all this is added a well printed description of the habits, usual location, and manner of growth of the tree.—*London Daily News.*

Proceedings of the Club.

The annual business meeting was held at Columbia College, Jan. 12th, Dr. J. S. Newberry in the chair.

The reports of officers were read and accepted.

The Recording Secretary reported 74 members on the roll.

The Curator reported 703 plants mounted during the past year, and 1,230 species in the Local Herbarium.

The Librarian announced 60 exchanges with the BULLETIN.

The following were elected active members: Miss Eliza Youmans, Miss M. B. Flint, and Messrs. E. E. Sterns, E. B. Southwicke and P. H. Dudley.

Messrs. I. C. Martindale, W. M. Canby, Randall Spaulding and Dr. A. W. Chapman were elected corresponding members.

Dr. N. L. Britton, Arthur Hollick and P. H. Dudley were appointed to inaugurate a series of public lectures on botanical subjects during the present year.

The following officers were elected for the current year: President, Dr. J. S. Newberry; Vice-President, Thomas Hogg; Treasurer, Wm. H. Rudkin; Recording Secretary, Arthur Hollick; Corresponding Secretary, Maria O. Steele; Editor, Elizabeth G. Britton; Associate Editor, F. J. H. Merrill; Curator, M. O. Steele; Librarian, N. L. Britton.

The following standing committees were appointed: *Finance*, John L. Wall, J. O. Poggenburg; *Admissions*, Benjamin Braman, Joseph Schrenk; *Library and Herbarium*, N. L. Britton, Miss M. O. Steele, Miss H. C. Gaskin, Miss Alice Rich.

Rev. L. H. Lighthipe read a list of rarer plants collected in New Jersey.

FIG. 12.

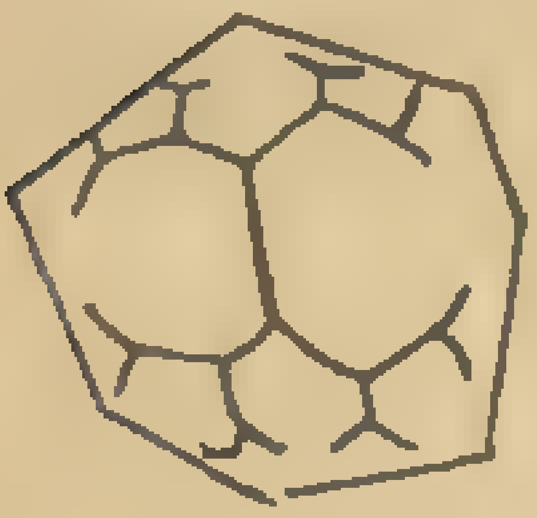

FIG. 13.

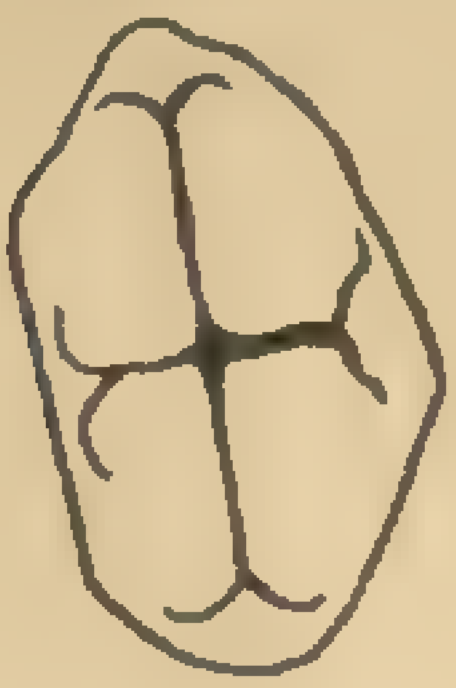

FIG. 14.

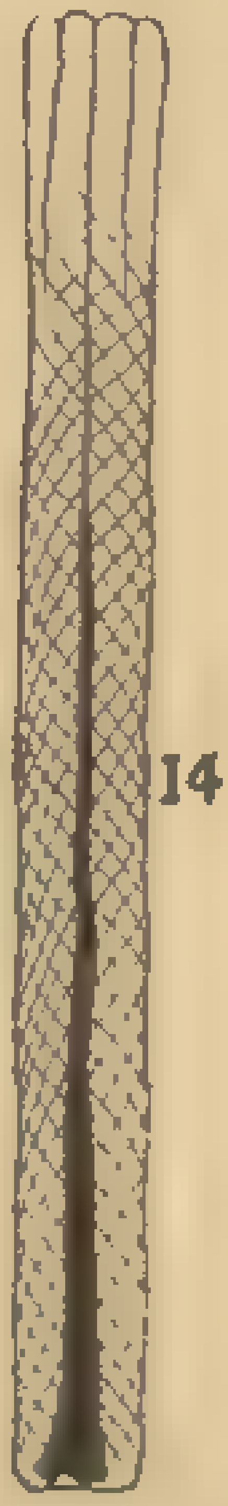

FIG. 15.

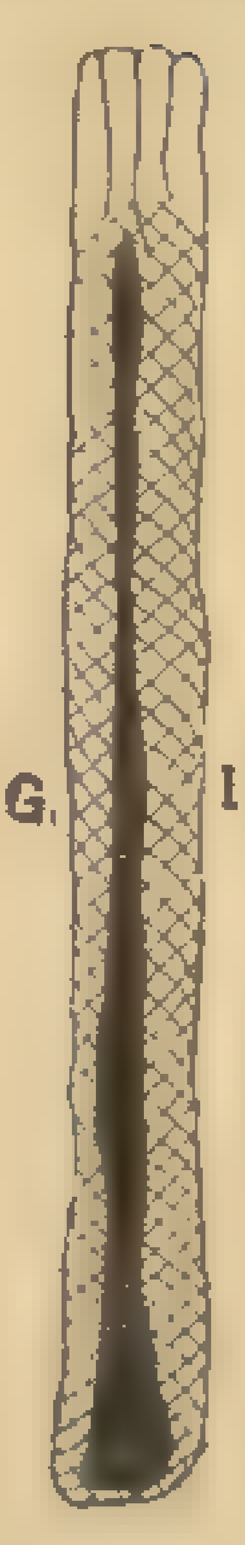

FIG. 16.

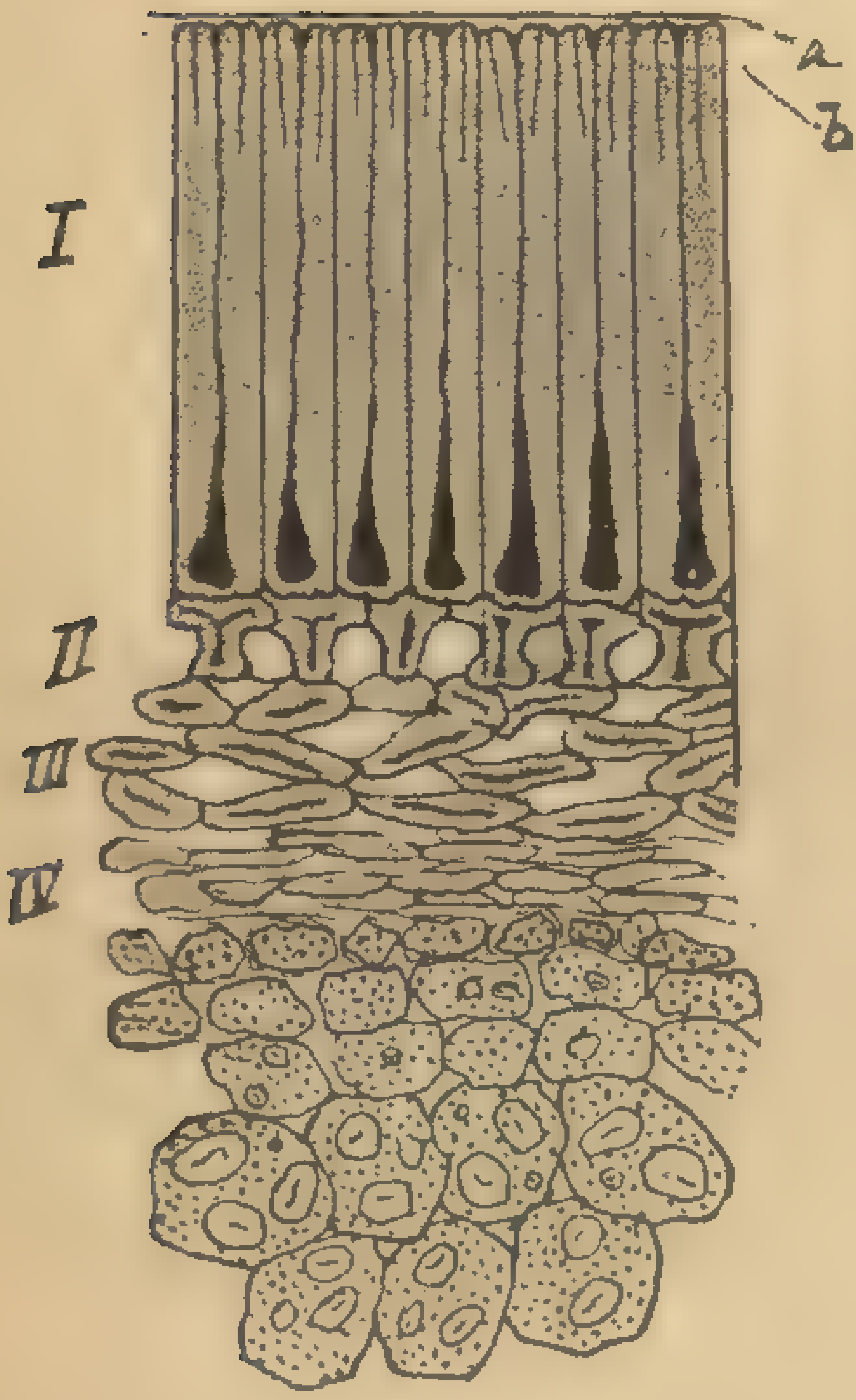
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FIG. 17.

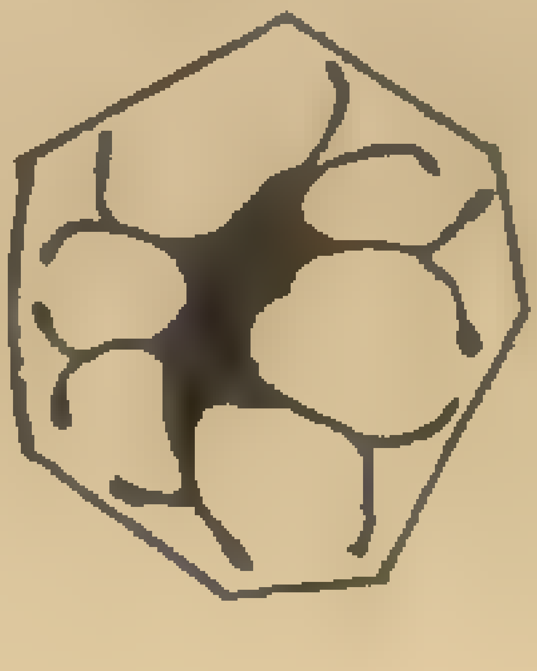

FIG. 18.

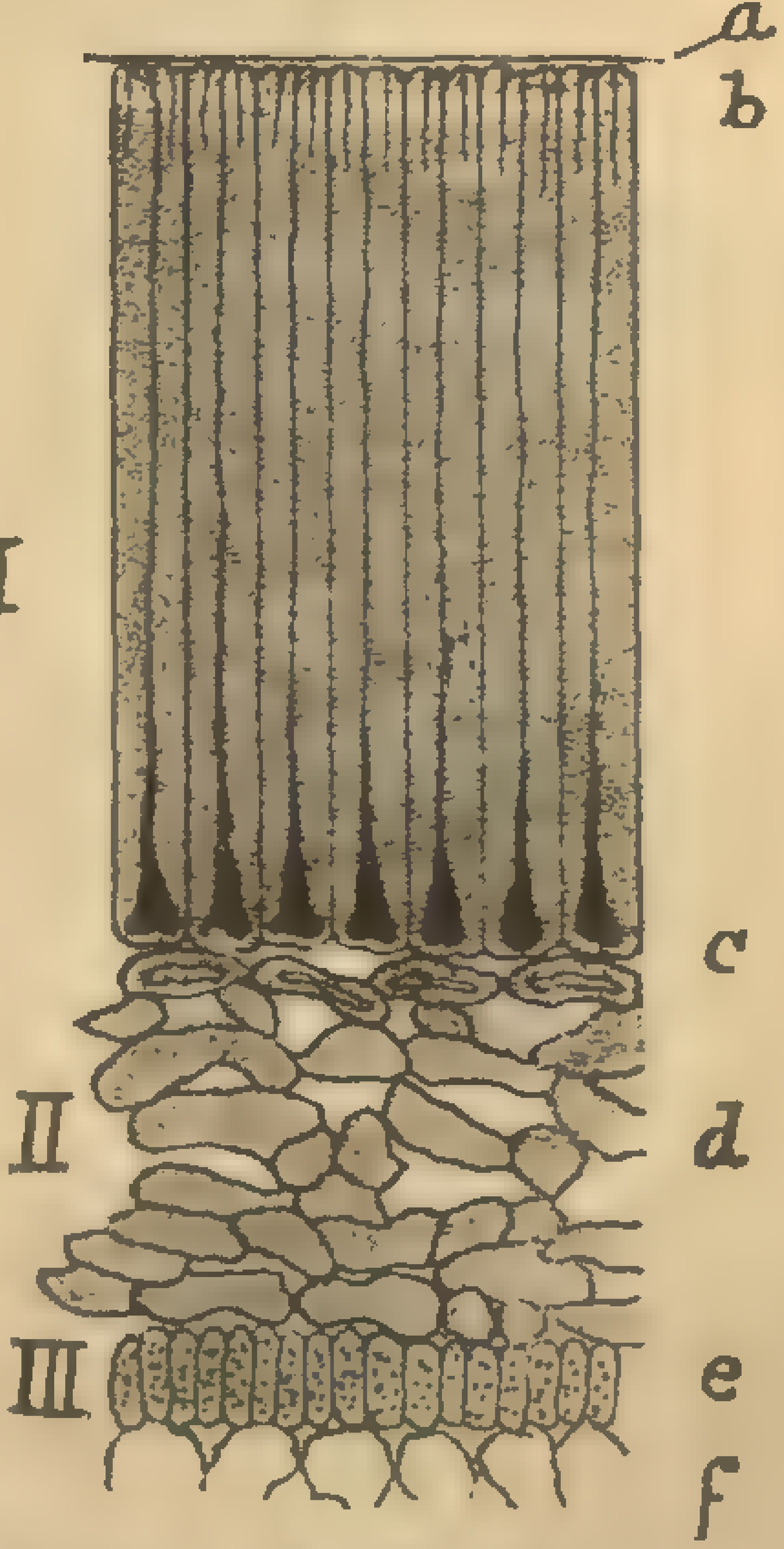
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FIG. 19

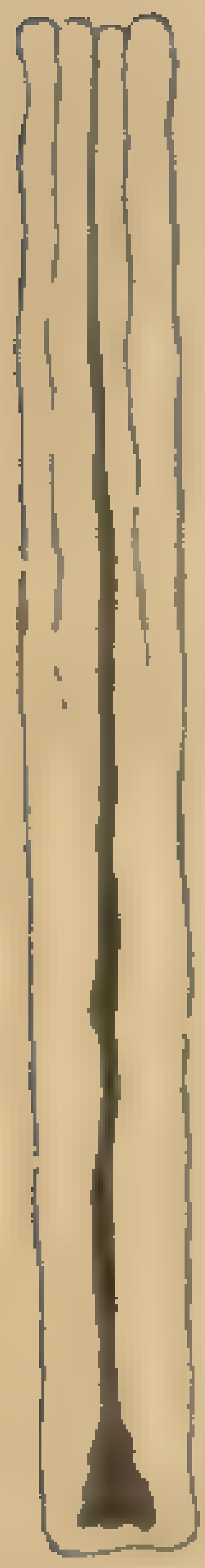


FIG. 20.

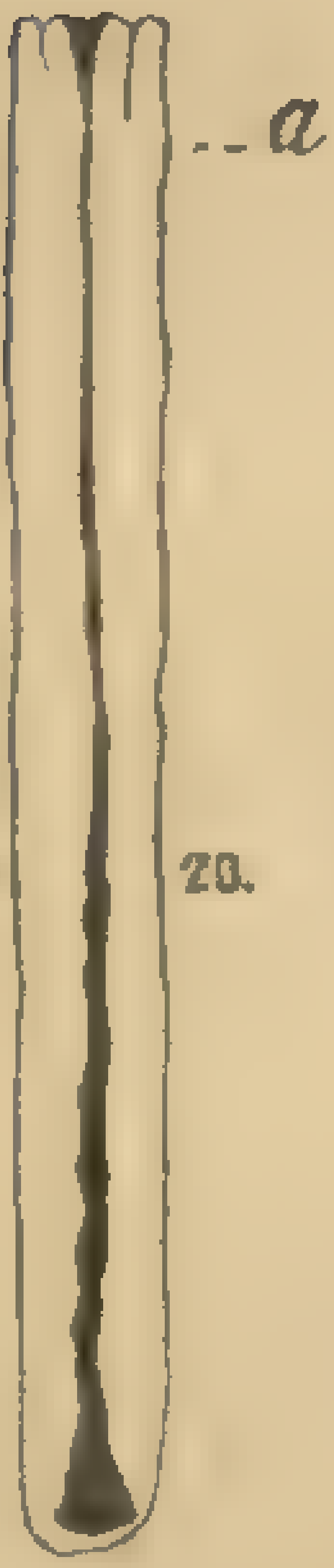
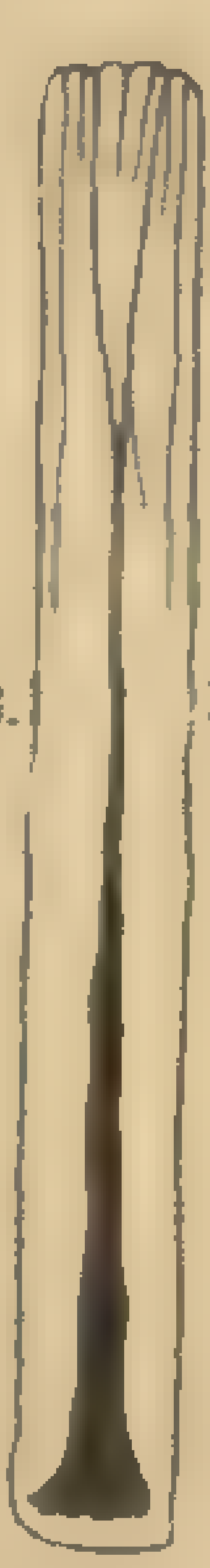


FIG. 21.



Structure of some Leguminous Seed Coats. L. H. Pammel.

FIG. 1.

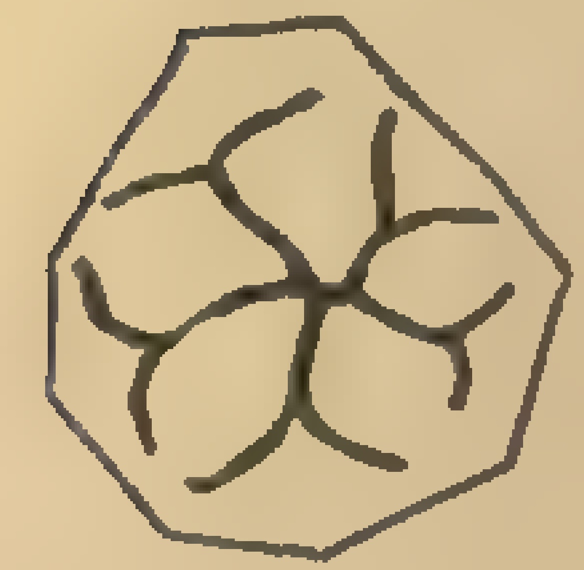


FIG. 2.

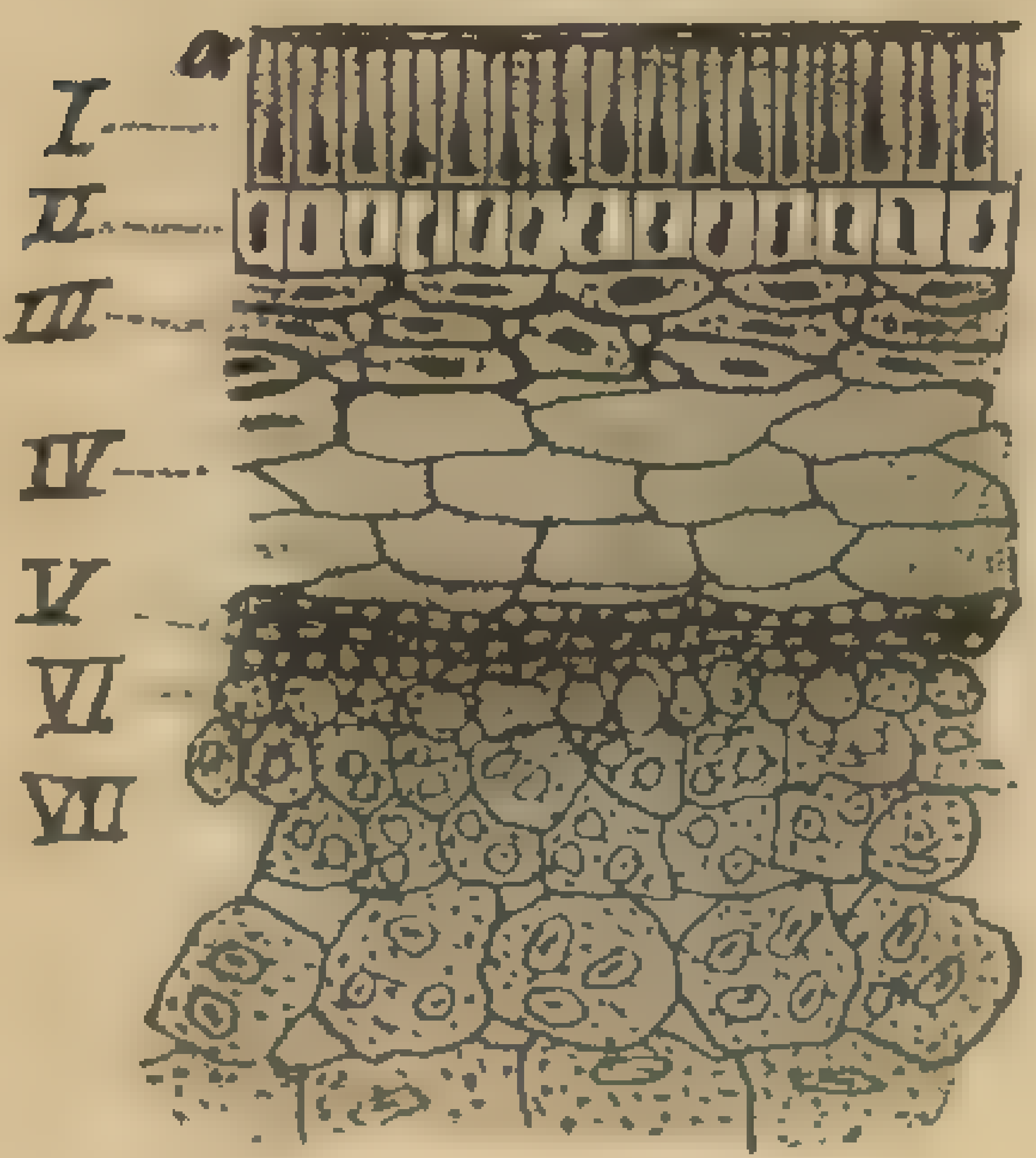

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FIG. 4.

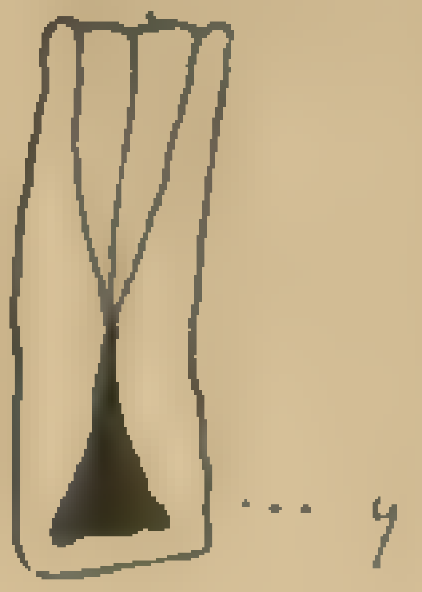
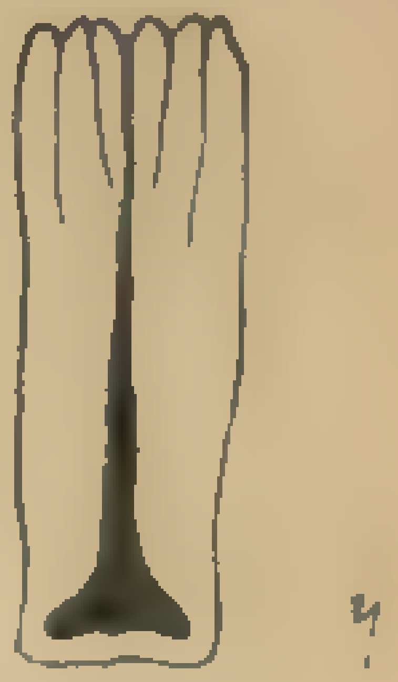


FIG. 3.



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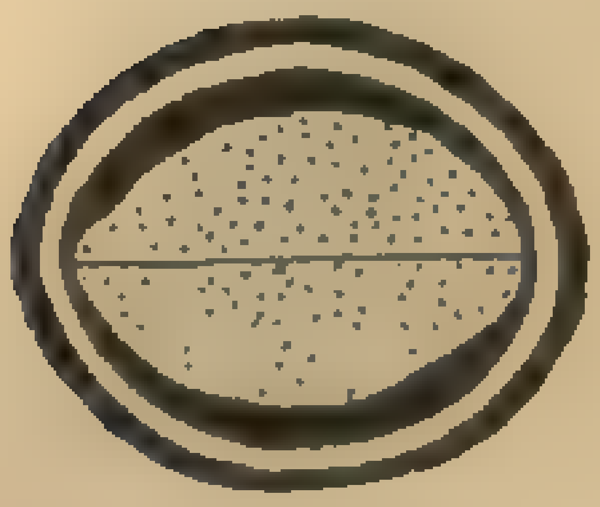

FIG. 8.

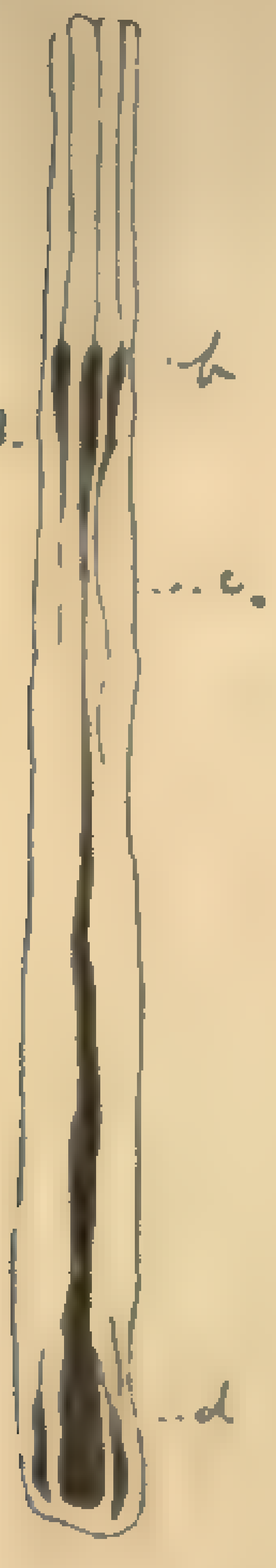

FIG. 9.

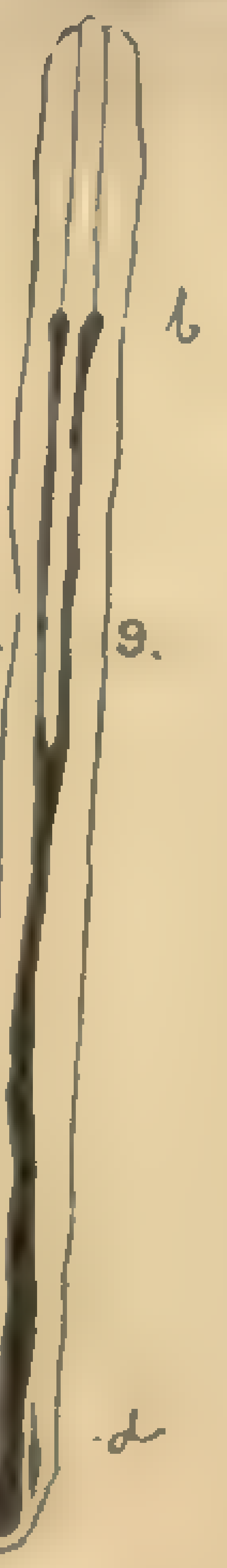

FIG. 10.

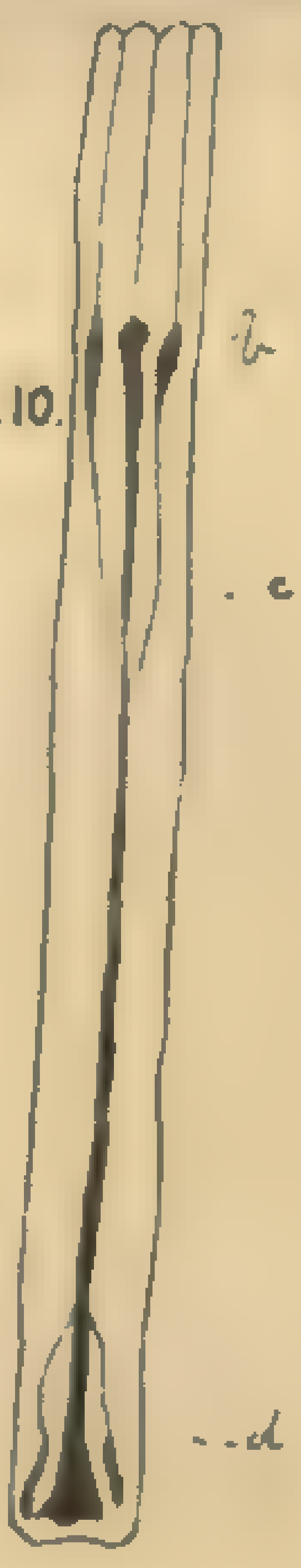

FIG. 7.

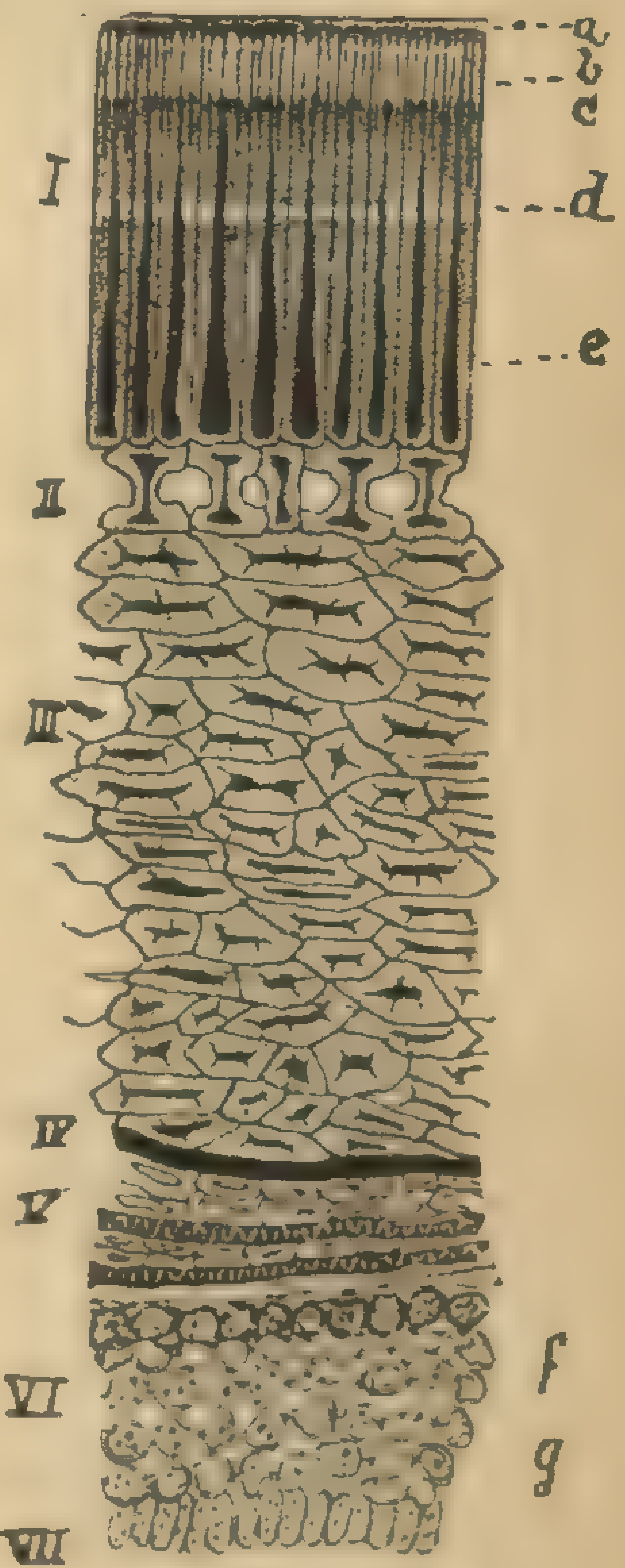
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FIG 11

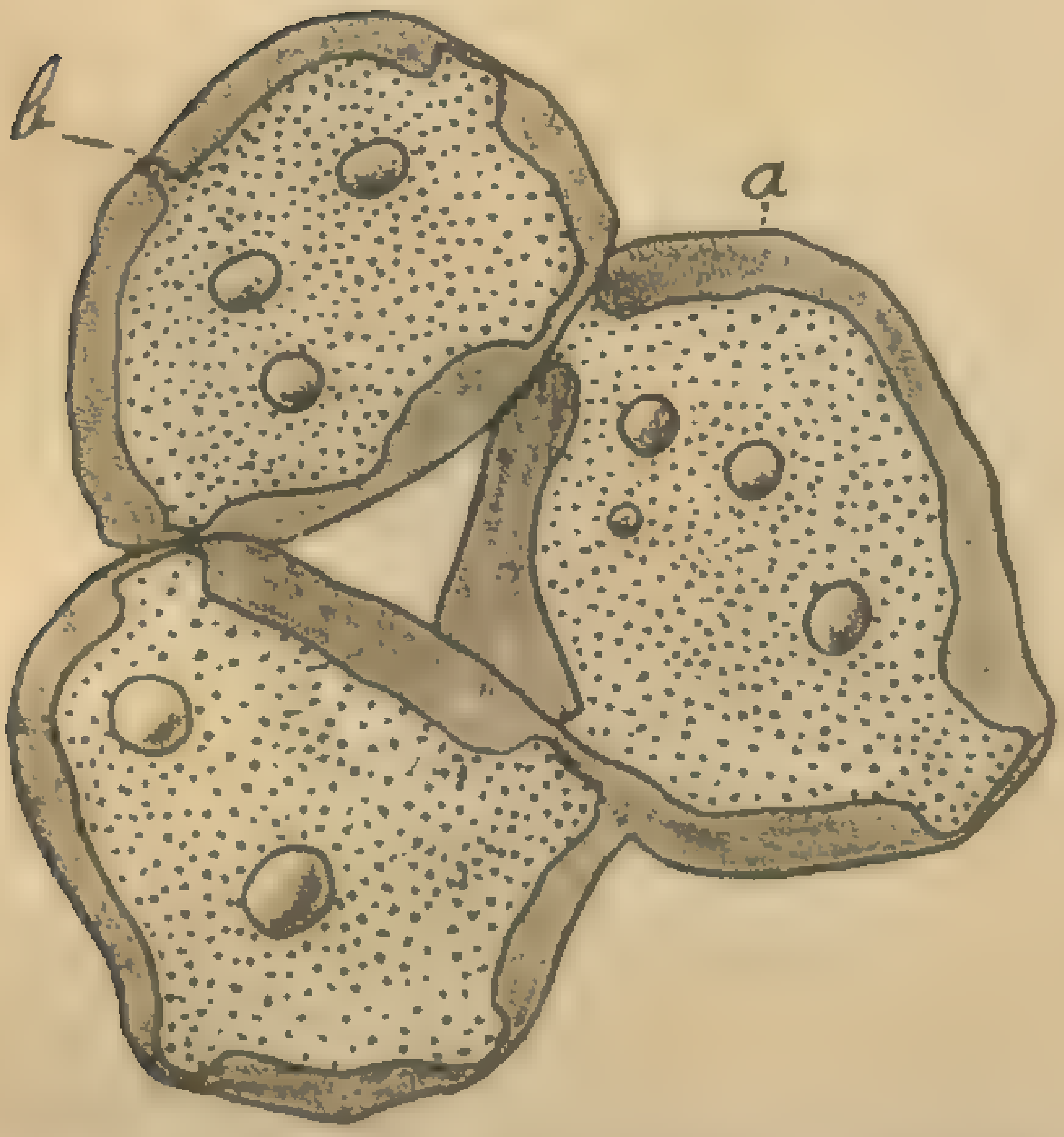
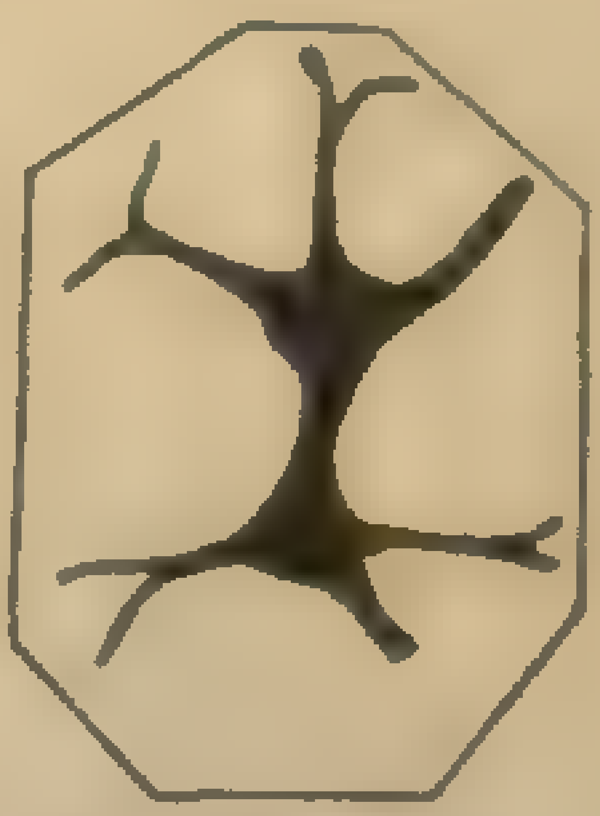


FIG. 6.



Structure of some Leguminous Seed Coats. L. H. Pammel.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XIII.] New York, February, 1886. [No. 2.

On the Structure of the Testa of Several Leguminous Seeds.

By L. H. Pammel.

Plates LII and LIII.

The structure of the seed-coats of numerous *Leguminosæ* has been studied by several able observers,* but as their observations relate in the main to thin-walled seeds, like those of *Phaseolus*, *Pisum* and *Vicia*, I undertook an examination of the exceedingly hard seeds of the Kentucky Coffee Tree, and of the Sea Bean and Calabar Bean at the suggestion of Prof. Trelease, in whose laboratory the work was done. I am greatly indebted to him for many suggestions in connection with the work, as well as for the use of literature on the subject. The common garden bean, or haricot bean, *Phaseolus vulgaris*, has been taken as illustrating the typical structure of the leguminous seed. Haberlandt has fully described the structure and development of the seed-coats of *Phaseolus*,* but the following resumé of the results

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*J. Gaertner, "De Fructibus et Seminibus Plantarum," 1791, ii., p. 325, describes the seeds of *Vicia pisiformis*, *V. nodosa*, *V. biennis*, *V. hybrida.*

G. W. Bischoff, Handbuch der bot. Terminologie und Systemkunde, 1883, Taf. XLIII., Fig. 1869.

M. J. Schleiden und J. R. Th. Vogel, Ueber das Albumen insbesondere der Leguminosen. Nov. acta d. Leop. Carol. Academ. xix., pt. II., p. 51.

F. Nobbe, Handbuch der Samenkunde, 1876, pp. 79–80 and 84, figures and describes the seed coats of *Medicago sativa*, *Trifolium pratense* and *Vicia faba.*

A. Sempolowski, Beitraege zur Kenntniss des Baues der Samenschale. Inaugural dissertation, Leipzig, 1874, 3 Taf.

J. Chalon, La graine des Legumineuses, (1) cellules de la carapace, (2) albumen, Mons, 1875.

M. G. Monnier, Recherches sur la nervation de la graine. Ann. des Sciences Naturelles, 5 series, xvi., 1872, p. 233.

Günther Beck, Vergleichende Anatomie der Samen von *Vicia* und *Ervum.* Kaiserlichen Akademie der Wissenschaften, Wien, 1878, lxxvii., I. Abtheilung, p. 545, 2 Taf.

R. Junawiez, Die Lichtlinie in den Prismencellen der Samenschalen. Kaiserlichen Akademie der Wissenchaften, Wien, 1877, I Abth, lxxvi., p. 335, 2 Taf.

Georg Lohde, Ueber die Entwickelungsgeschichte und den Bau einiger Samenschalen. Inaugural dissertation, Leipzig, 1874, 2 Taf.

Joh. Friedrich Fickel, Ueber die Anatomie und Entwickelungsgeschichte der Samenschalen einiger *Cucurbitaceen.* Inaugural dissertation, Leipzig, 1876, 2 Taf.

of my own examination, though agreeing in general with his statements, is given to facilitate comparison when the other seeds are described:

THE COMMON GARDEN BEAN (*Phaseolus vulgaris*, Savi.)—In the seed-coats of the common garden bean there are five well-marked layers: I. The palisade layer. II. The crystal layer. III. A layer of simple parenchyma. IV. A layer in which the fibro-vascular elements are found, surrounded by parenchyma. V. A layer of very compact branched cells.

The cuticle covering the palisade cells, as described by Haberlandt, is very hard to distinguish because of its tenuity and the difficulty involved in getting sections which are thin enough, while in some varieties it has a tendency to flake off.

The prismatic palisade cells are five, six or more sided, and in a surface view show a branched cell cavity (Fig. 1). In a cross section of the seed-coats (Fig. 2) the cells are seen to be greatly elongated radially. The central cell cavity, which is somewhat widened at the base, extends nearly the entire length of the cell to the cuticle (Fig 3).[†] As a consequence of this gradual widening, the lateral walls gradually become thinner towards the base (Figs. 3 and 4).

In an isolated palisade cell, macerated in concentrated potash, or in Schultze's medium, the structure of the folds and the cell cavity are more clearly indicated, as shown in Figs. 3 and 4.

In the colored varieties of *Phaseolus*, the cell cavities are filled with a pigment. The narrow "light line" runs close under the cuticle (Fig. 2, 1^a.)[‡]

In a surface view the cells of the second layer are five or six sided, very thick-walled, and the cavity appears to be filled with a crystal of calcium oxalate.[§]

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[*] G. Haberlandt, Ueber die Entwickelungsgeschichte und den Bau der Samenschale bei der Gattung *Phaseolus*. Separat abdruck aus den Sitzungsbericht der Kais. Akad. der Wiss.; Wien, 1877, lxxvi., I. Abth.

[†] There are some apparent exceptions to this, as in some cases this portion of the cavity seemed only to extend up about one-third of the distance.

[‡] *Sicyos angulatus* is said to have peculiar refractive portions so characteristic of *Leguminosæ*, but they are present in the third layer. (See Fickel, l. c., p. 11, Plate I., Fig. 22.)

[§] In some of the varieties of *Phaseolus vulgaris* the cells present a different appearance, since they do not contain crystals. The inner layer of parenchyma cells in the seed-coats of *Sicyos angulatus* contain, according to Fickel (l. c., p. 11) crystals of calcium oxalate in the course of their development, but these disappear when the seed has fully ripened.

In a radial section (Fig. 2, II) the crystals, which are often twinned, fill more or less completely the I-shaped cavity, which is almost obliterated by the swollen lateral walls where it is not distended by them.

The cells of the third layer are elongated laterally, are thin-walled and separated by numerous intercellular spaces. In a tangential section they are star-shaped. The cell cavities are filled with fine granular protoplasm. Some of these cells in the colored varieties contain pigment.

The cells of the fourth layer are elongated laterally and are also thin-walled; they differ from those of the third layer in that the cells are longer and larger. In colored varieties some of these cells contain pigment. The fibro-vascular elements are present in this layer.

The cells of the last layer are very compact and appear small in a radial section. However, their true structure can only be determined in a tangential section, when the cells are seen to resemble somewhat the star-shaped cells of the third layer, but they differ from those in that they are more dichotomously branched. The cell contents are made up of fine, granular protoplasm.

THE KENTUCKY COFFEE BEAN (*Gymnocladus Canadensis*, Lam.)—The seed of the Kentucky Coffee Tree is anatropous and has a straight embryo. With a small magnifying glass there can be readily distinguished three distinct layers in the seed-coats. The innermost of these is the thickest and darkest layer (Fig. 5). On the upper flattened side it generally diminishes in thickness as it approaches the poles of the seed. Above the palisade layer is the rather thickened cuticle, which has a tendency to separate from the palisade cells. This layer when macerated in water and allowed to stand, sometimes breaks up into small pieces and separates from the remaining part of the seed-coat. It is then somewhat mucilaginous. In a surface view the palisade cells are much the same as in *Phaseolus*, excepting that the central cavity (Fig. 6) is greatly enlarged and the folds are less distinct and marked as regards their branching. In a cross section (Fig. 7) six well-defined layers may be distinguished. I. The palisade layer. II. A layer of I-shaped cells. III. A layer of sclerenchyma. IV. A layer carrying pigment. V. A layer of vessels and thick-walled parenchyma. VI. A layer of star-shaped parenchyma-cells.

The palisade cells are greatly elongated radially; the lateral walls are thickened as in *Phaseolus*, but more uniformly, because of the uniformity of the cell cavity (Figs. 8, 9 and 10). In Figs. 7, 8, 9 and 10 at *b*, several prominent rounded points may be seen which refract light very strongly. This appearance is not affected when the cells are macerated in potash, or Schultze's medium, or when allowed to decay, somewhat, in water. The cell cavity is slightly enlarged at the base (Figs. 7, 8, 9 and 10, at *d*.), diminishing in calibre upward to *e*, when it again begins to enlarge to the point *b*. From *a* to the cuticle the cell cavity is faint and can only be definitely made out in stained sections.*

The folds are from two to eight in number and vary greatly in their length and manner of joining the cell cavity. In Figs. 8, 9 and 10 the refractive points are shown; they have the same peculiarity that the cell-cavity has. From *b* to the cuticle (Figs. 8, 9 and 10) the folds are very faint, and can only be distinctly seen after staining. In the lower portion of the palisade cells (Figs. 8 to 10) are several slight folds which generally arise gradually. After they have attained considerable breadth they begin to diminish in size and end as fine threads. Sometimes they are apparently disconnected from the cell cavity, as in Fig. 8, and in some cases they have more than one of these fine endings. There are two well-developed light lines on these cells,† a wide and a narrow one. The wide light line begins close under the cuticle, extends to the refractive points (Fig. 7, *a*-*b*), and is lighter in its upper than in its lower portion. The narrow line (Fig. 7, *c*) is situated slightly above the central part of the palisade cells and has a much clearer definition than the broad line. The second layer is made up of I-shaped support-cells, homologous with the crystal layer of *Phaseolus*, but having numerous intercellular spaces. The cavity of these cells is very narrow at the middle (Fig. 7, II., *e*), enlarging as it reaches the upper and lower cross-bar, thus giving to it also the shape of an I. The third layer differs remarkably from any of the others; the cells are more or less elongated laterally, that is, in the direction of the seed-coat. The cell walls are greatly thickened and are beautifully pitted. The cell cavity is very narrow, and often has an irregular outline with peculiar markings. The cells of this layer change somewhat in size and shape as they are followed inwardly, becoming more like the parenchyma of the fifth layer. The fourth is a very narrow layer and carries a brownish-yellow pigment. This is followed by the fifth layer, which is made up of a comparatively thick-walled parenchyma; well-developed spiral vessels are also found in it.

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*The fluids used were methyl violet and chloriodide of zinc.

†I shall speak of their behavior with micro-chemical tests in another connection.

The sixth layer may be divided into two parts. In the first the intercellular spaces are small, while in the second they are large and numerous. The first part (*f*) is made up of thick-walled, star-shaped cells, which have an irregular outline (Fig. 11). The cell walls are thickened irregularly, as shown in the figure. There are from one to four pits in a cell wall; sometimes these pits are small and narrow (Fig. 11., *b*). A number of oil globules are usually distributed through the protoplasm of each cell. The cells of the second portion (*g*) of the sixth layer are star-shaped in a tangential section, and have the same peculiar pitted walls as those of *f*. The cell walls of one kind of these cells are thinner than those of *f*, while the cells of a second kind have as thick walls as those of *a*, Fig. 11. The protoplasm is very granular and has oil globules distributed through it.

THE CALABAR BEAN (*Physostigma venenosum*, Balf.)—There is a marked difference between the seed-coats of *Gymnocladus* and those of the calabar bean. The former, when soaked in water, become mucilaginous and fragile, whereas the seed-coats of the latter are coriaceous and somewhat flexible and have some affinities with those of the sea bean.

In a surface view the palisade cells are five or six sided and very often elongated (Fig. 13). The folds are often branched equilaterally, as in Fig. 12, or are of an abnormal form, as shown in Fig. 13. A peculiar feature of these palisade cells, macerated in concentrated potash, is that they show numerous intersecting striations (Figs. 14 and 15) running obliquely, or almost horizontally, about the cells.* The cell cavity is quite uniform in breadth, gradually diminishing upwards, as in Fig. 14, or sometimes quite abruptly, as in Fig. 15. In some cells the cavity plainly extends to the cuticle, though in others it cannot be traced so far. A number of folds run down into the lateral walls, rarely, however, obviously entering the cell cavity as in *Phaseolus* or *Gymnocladus*.

The I-shaped support-cells (Fig. 16, II.) are similar to those of *Gymnocladus*, though the intercellular spaces and I-shaped cavities of the cells are frequently larger. The third evident layer (Fig. 16, III.) is made up of loose, thick-walled cells with numerous intercellular spaces. The cells of the fourth layer are rather more compact, are elongated laterally and carry the brown pigment.

THE SEA BEAN (*Mucuna urens.*)—The seed-coat of the sea bean is exceedingly hard, but is only composed of two well defined layers; a palisade layer, having a brownish color, and a layer of loose parenchyma, the cell walls of which are colored dark brown.

In a surface view (Fig. 17) the palisade cells are five or six sided, with the characteristic foldings of *Phaseolus* and *Gymnocladus*, excepting that the central portion is greatly enlarged. In most cases the folds terminate in the angles of the cells and are often slightly enlarged. In a cross section of the seed-coat (Fig. 18,) the thickened cuticle of the palisade layer is well defined (*a*,) as is also the light line (Fig. 18, *b*) which runs close under the cuticle and is somewhat broader than in the calabar bean. In an isolated palisade cell (Figs. 19, 20 and 21) the cavity is seen to extend to the cuticle; it is much wider at the base than is the cell cavity of the calabar bean. At Fig 20, *a*, it is indistinct and small; it, however, gradually enlarges upwards until it reaches the cuticle, where it attains considerable breadth. The outline of the cell cavity is irregular and wavy. The folds extending into the lateral walls are very variable; some are very short, as in Fig.

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*According to A. Sempolowski, l. c., p. 26, Plate II., Fig. 16, the palisade cells of the seed-coats of *Lupinus angustifolius*, *L. luteus.*, *L. albus*, *L. hirsutus*, *L. pilosus*, and *L. Cruikshankii* have, in the lower part of the cell, what he has called pore-canals, in the form of the cross striations which I have described in the calabar bean. The cross-striations of the calabar bean are plainly not pore-canals.

20; others straight and longer, as in Fig. 19. Though small, the folds are well defined The same clear definition was also obtained in a surface view of the palisade cells. In none of the specimens studied could the outlines of the cell walls, their cavities, or of the folds be made out as in this species. The palisade cells show a slight indication of the characteristic striations of those of the calabar bean.

The second layer (Fig. 18, II) may be divided into two parts. The first of these is a single layer of cells homologous with the crystal layer of *Phaseolus* and the I-shaped layer of *Gymnocladus* and *Physostigma.** But according to A. Sempolowski (l. c., pp. 28, 30), the second layer is not identical in its structure with the layers which follow, but has the true support-cells. There are certainly gradations from true support-cells to the parenchyma which follows in many of the *Leguminosæ*. (G. Beck and others.)

The cells of this layer differ from those that follow in that they are much thicker walled and have a small cell cavity. They are separated by narrow and large intercellular spaces. The fibro-vascular elements are present in the lower portion of this layer.

These are the chief characteristics of the seed-coats under consideration. From the account which has been given, it will be seen that the hard-walled leguminous seeds do not differ much in the nature and arrangement of their protecting envelopes from those of a less resistant character, their greater firmness depending usually upon the greater development of one or more of the layers which are normally present, and upon differences in the nature of the walls of their component cells. The microchemical behavior of the walls in the several cases, and especially certain interesting peculiarities of the refractive portions constituting the so-called light lines, must, however, be reserved for consideration in another place.

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*According to Nobbe, Samenkunde, p. 79, the cells between the palisade layer and aleurone layer of *Trifolium pratense*, and *Medicago sativa* are identical in structure, excepting the fibro-vascular elements carried in the lower portion of the layer.

Günther Beck (l. c., p. 547), speaks of the "Hartschichte" and the "Quellschichte"; in the latter he places (1) the I-shaped support-cells, (2) the true absorbing tissue, (3) the fibro-vascular elements and their surrounding tissue.

EXPLANATION OF PLATES.

Figs. 1-4. *Phaseolus vulgaris.*

Fig. 1. Surface view of palisade cell; × 700.

Fig. 2. Cross section of seed-coat; × 120. I. Palisade layer; *a*, narrow light line. II. Crystal layer. III. Layer of simple parenchyma. IV. Layer of parenchyma, containing fibro-vascular elements. V. Layer of compact, branched cells. VI. Aleurone layer. VII. Starch layer.

Figs. 3-4. Isolated palisade cells, macerated in potash; × 250.

Figs. 5-11. *Gymnocladus Canadensis.*

Fig. 5. Cross section of bean; natural size.

Fig. 6. Surface view of palisade cell; × 700.

Fig. 7. Cross section of the seed-coat; × 120. I. Palisade layer; *a*, cuticle; *b*, wide light line; *c*, refractive points; *d*, narrow light line. II. I-shaped support-cells. III. Sclerenchyma cells. IV. Pigment layer. V. Layer of thick-walled parenchyma and spiral vessels. VI. Layer of star-shaped parenchyma cells; *f*, upper portion; *g*, lower portion. VII. Aleurone layer.

Figs. 8, 9 and 10. Isolated palisade cells, macerated in potash; × 175; *b*, refractive points.

Fig. 11. Cells of upper portion of VI. layer; × 350.

Figs. 12-16. *Physostigma venenosum.*

Figs. 12 and 13. Surface view of palisade cells; × 700.

Figs. 14 and 15. Isolated palisade cells, macerated in potash; × 175.

Fig. 16. Cross section of seed-coat; × 120. I. Palisade layer; *a*, cuticle; *b*, light line. II. I-shaped cells. III. Loose, thick-walled parenchyma. IV. Pigment layer.

Figs. 17-21. *Mucuna urens.*

Fig. 17. Surface view of palisade cell; × 700.

Fig. 18. Cross section of seed-coat; × 120. I. Palisade layer; *a*, cuticle; *b*, light line. II. *c* is the homologue of the I-shaped support-cells in *Gymnocladus Canadensis*, and of the crystal layer in *Phaseolus vulgaris.* III. Aleurone layer.

Figs. 19, 20 and 21. Isolated palisade cells, macerated in potash; × 175.

New American Grasses.

By George Vasey.

Eriochloa mollis, Kth.; var. longifolia.—Culms 2 to 4 feet high, slender and branching, leafy; leaves very narrow (2 lines wide), 1 to 2 feet long; culm and leaves smooth except at the nodes; lower sheaths nearly as long as the joints; panicle slender, 5 to 8 inches long, of 5 to 8 pedicellate, alternate spikes, the lower ones 1½ inches long, gradually shorter; general rhachis and branches finely pubescent; the spikes at first erect, in fruit nearly horizontal, each with about ten to twelve alternate, nearly sessile spikelets, which are rather sparingly appressed-pubescent and acute. It differs from the species in its much more slender culms, narrower and longer leaves, and in its much smaller panicle, with shorter and fewer flowered spikes.

Collected at Key West, Florida, by A. H. Curtiss.

Panicum Nealleyi.—Stem 3 to 4 feet high, stout, simple or sometimes branched, leafy, smooth; leaves linear-lanceolate, 3 to 10 inches long, 3 to 5 lines wide, thick, smooth, or nearly so, rough on the margin, acuminate, striate, slightly hairy at the throat and margin of the sheaths; ligule short, membranaceous, sheaths mostly shorter than the joints; panicle long peduncled, oblong, 5 to 8 inches long, 3 to 4 inches wide, rhachis and branches glandular or viscid in spots, the branches single and scattered, or somewhat verticillate, much divided and many flowered; spikelets purplish, 1 line long, ovate, acutish, sparingly-pubescent, the lower glume broad, hardly one-fourth as long as the second and third, which are strongly nine-nerved; flowering glume oblong, acutish. This is closely related to *P. viscidum*, Ell., and is the same as *P. scabriusculum* of Chapman's Flora, but cannot be the true plant of Elliott, as that is related to *P. virgatum*. Collected in Texas by Mr. G. C. Nealley.

Panicum repens, L.; var. confertum.—Flowering culms about 1 foot high, from thick, creeping, short-jointed root-stalks; leaves distichous, rigid, 2 to 3 inches long, spreading; the panicle 1 to 3 inches long, denser than in the type, the branches shorter and the spikelets closer together. Collected in Louisiana by A. B. Langlois.

PANICUM VIRGATUM, L.; var. MACRANTHUM.—Whole plant glabrous and glaucous, apparently 4 to 5 feet high, leaves rigid, the upper part long setaceous involute; panicle 1½ feet long, diffuse, the lower branches 6 to 8 inches long, flowering chiefly toward the extremities; spikelets very large, 3 lines long, the lower glume five-nerved, very acute, two-thirds as long as the second glume, which is strongly nine-nerved; third glume seven-nerved; perfect flower oblong, 2 lines long. A striking form, with very large spikelets, collected by Dr. Havard, in the Guadalupe Mountains, Texas.

Var. CONFERTUM.—A form with a close panicle, observed particularly on the sea-coast.

Var. ELONGATUM.—Panicle elongated and narrow, with the spikelets unusually slender; perhaps this is the *Panicum elongatum* of Pursh.

Var. DIFFUSUM.—Panicle longer and diffuse, spikelets more distant, and the lower glume nearly or quite as long as the second and third. Sandy prairies, Kansas, Colorado, etc.

IMPERATA BREVIFOLIA.—Culms 3 to 4 feet high, erect from a creeping rhizome, firm, smooth; radical leaves numerous, 4 to 10 inches long, plain, smooth, very acute, 4 to 5 lines wide, contracted and long ciliate at the base, ligule short, membranaceous; cauline leaves, four or five, short, first about 4 inches, second 3 inches, third 2 inches, fourth 1 inch long, rather rigid, acute, with a few long hairs at the base; ligule short ciliate, sheaths smooth, the upper ones elongated, (6 to 7 inches long); panicle erect, nearly cylindrical, 5 to 9 inches long, ½ to ¾ inches wide; branches of the panicle appressed, sparsely short-hairy below, with spikelets in pairs, one sessile, and the other pedicellate, toward the apex the spikelets single; the pedicels slightly hispid, and emitting a few long silky hairs; the outer glumes about 1¼ lines long, the upper a little longer, lance-oblong, obtusish; the lower five-nerved; upper three-nerved and ciliate at the apex; both villous on the back with long silky hairs, which are about 3 lines long; third glume smooth, very thin, hyaline, about as long as the first; fourth glume two-thirds as long, narrow; palet bifid, broad, hyaline, nerveless, ¾ line long; stamen one.

Southern California, 1031 Parish; New Mexico, 2001 C. Wright; also from Arizona and Western Texas.

✓

Aristida Arizonica.—Culms 1 to 2 feet high, tufted, rigidly erect, unbranched, leafy to the middle, smooth; leaves of the culm about four, of nearly equal length, 4 to 8 inches long, canaliculate or becoming convolute, narrow and somewhat rigid, smooth; panicle 5 to 10 inches long, narrow; the branches in twos below, appressed, somewhat distant (the lower internodes 2 to 3 inches long), unequal, the longer one overlapping the internode above, and naked below, the shorter one sessile, each with two to eight short pedicelled spikelets; outer glumes nearly equal, 6 to 7 lines long, bidentate at the apex, mucronate or awn pointed, hispid on the keel, one-nerved or the lower three-nerved; flowering glume to the division of the awn and including the short hairy callus, 7 to 8 lines long, slender, smooth below, scabrous and twisted above, the awns nearly equal, 10 to 12 lines long, widely divergent when mature. This species differs from *Aristida purpurea*, Nutt., in a more rigid habit, longer leaves, more erect and rigid panicle, and especially in the comparative length of the glumes (in *A. purpurea*, lower glume is only about half as long as the upper); in the longer flowering glume, (in *A. purpurea* the upper glume considerably exceeds the flowering one), and in the shorter awns. Collected in Arizona. ✓

Aristida Havardii.—Culms about 1 foot high, slender, leafy; leaves setaceous, erect, 3 to 5 inches long, the upper one enclosing or near the base of the panicle; panicle 5 to 6 inches long, somewhat pyramidal; branches mostly in twos, unequal, almost capillary, spreading and sometimes reflexed, the longest about 2 inches long, loosely flowered, the lower part (¼ inch) naked; spikelets pedicelled; outer glumes nearly equal, 4 to 5 lines long, narrow, one-nerved, acuminate, the upper a little longer than the flowering glume, including the short obtuse hairy callus; the flowering glume smooth below, spotted, and tapering to the scabrous apex, awns erect-spreading, nearly equal, about 6 to 8 lines long.

This has somewhat the appearance of *A. divaricata*, but is much smaller, and without the long naked branches of that species. Collected in Western Texas by Dr. Havard.

Aristida Orcuttiana.—Culms about two feet high, stout ✓ below, above becoming slender, very leafy; leaves near the base with loose open sheaths and rather broad blades, the upper narrow, becoming involute, 5 to 8 inches long or more; panicle long and open, 4 to 5 inches long; branches rather distant, mostly single, flexuous, the lower ones about 3 inches long, the lower half naked; lower glume about 5 inches long, the upper one-quarter shorter; flowering glume with the awn 9 lines long, the lateral awns obsolete or nearly so; the main awn bent near the middle, and twisted below. The panicle is small for the size of the plant, and comparatively few flowered. It approaches *Aristida Schiediana*. Southern California, C. R. Orcutt; Arizona, M. E. Jones.

ARISTIDA SCHIEDIANA, var. MINOR.—Culms 12 to 18 inches high, rather slender, sometimes branching at the lower nodes; leaves of the culm three or four, longer than the sheaths (4 to 8 inches long). Panicle 5 to 7 inches long, at first narrow, and the base enclosed by the upper sheath, becoming divaricate; branches capillary, alternate, single, but most of them dividing immediately into two to four long and nearly equal branchlets from 2 to 3 inches long, which are again divided about the middle, each into two or three smaller branchlets bearing few spikelets; outer glumes nearly equal, about 4 lines long, not awned; flowering glume about 5 lines, hispid-scabrous above, becoming somewhat twisted in age; lateral awns absent; terminal awn about 4 lines long.

This plant is much smaller and less robust than the type, and has not the very long naked branches of that species, in fact the aspect is so different that it might be considered a different species.

Collected in Arizona by Pringle, in 1884, and distributed as *A. Schiediana*; and by M. E. Jones at Bowie, Arizona, 1884.

The typical *A. Schiediana*, as we regard it, (No. 745 C. Wright, 1849, 2012 and 2070 C. Wright, 1851-2, No. 27 Havard, Texas, No. 385, Lemmon, Arizona), perhaps runs into *A. divaricata*, Willd, the lateral awns wanting in some specimens, in others occurring of various lengths and otherwise hardly separable.

Tuberiferous Hydrocotyle Americana, L.

During a stroll in the woods last fall, near Washington, D. C., in a moist, shady ravine on the banks of a small brook, I saw some thrifty patches of *Hydrocotyle Americana*. On pulling a handful I was surprised to see a number of whitish threads hanging from the axils of the lower leaves. On examination of these threads, which were from three to six inches long, I found that near the extremity of each of these was a short oblong or cylindrical tuber, from a quarter to half an inch long, and these tubers were undoubtedly for the propagation of the plants. Most of the specimens had evidently borne flowers and fruit at the upper axils, but three or four of the lower joints had developed these tuberiferous threads. I sent some specimens to Dr. Gray, who was interested in them, and wrote that he had often observed the threads, but never the tubers.

GEO. VASEY.

Index to Recent American Botanical Literature.

Anemone nudicaulis, n. sp. Asa Gray. (Botanical Gazette, xi., (1886) p. 17.

Dr. Gray calls attention to an undescribed species of *Anemone*, to which he gives the above name, from wet places near Sand Bay, Minnesota, in or near Canadian territory. The radical leaves resemble those of *A. Richardsoni*, but the involucre consists of a single petiolate leaf, or is wholly wanting; the akenes are tipped with rather short and hooked styles very unlike the long ones of the Arctic plant above mentioned. Flowering specimens are needed to complete the description of the species.

Apples distinguished by their Flowers. W. J. Beal. (Amer. Nat., xx., (1886) pp. 162-165.

Professor Beal suggests that instead of describing apples by their fruit alone, pomologists would do well to pay more attention to the floral characters, and extends the same suggestion to the varieties of other cultivated plants. He gives five figures illustrating the differences in floral structure in as many kinds of apples, which show marked differences in the relative lengths, breadths and hairiness of the styles and their stipes.

Asa Gray. By Charles R. Barnes. (Bot. Gazette, xi., (1886), pp. 1-10.)

An interesting account of Dr. Gray's life and an enumeration of his most important botanical works. A good photoheliotype portrait accompanies the article, and some of the letters and congratulations received by the Doctor on his seventy-fifth birthday are appended.

Bidens.—Barbed Awns of Achenia of. J. L. Zabriskie. (Jour. N. Y. Mic. Soc., i., pp. 198, 199.)

Entomophthora.—A new larval. J. C. Arthur. (Bot. Gazette, xi., pp. 14-17.)

This hitherto undescribed fungus is parasitic in the larvæ of the clover-leaf weevil (*Phytonomus punctatus*, Fabr.) and has been noticed in Western New York and the adjacent portions of Canada. Prof. Arthur gives it the name *E. Phytonomi*, and describes and figures the spores, hyphæ, mycelium, etc.

Erigeron Muirii, Gray, n. sp.

A woodcut figure may be found in the Report of the Cruise of the U. S. Revenue Steamer "Thomas Corwin," in the Arctic Ocean, 1881, Washington, 1885, p. 146. There is also a heliotype plate of the lichens *Cladonia uncialis, C. gracilis, C. rangiferina*, and *C. cornucopoides.*

Dispersion of some Tree Seeds. W. J. Beal. (Bot. Gazette, xi., pp. 17, 18.)

Mildews of the Grapevine. C. V. Riley. (Rural New Yorker, xlv., pp. 72, 73, 2 figs.)

Lobelia syphilitica.—Cross-fertilizing apparatus of. J. L. Zabriskie. (Jour. N. Y. Mic. Soc., i., pp. 201, 202.)

Pollen Spores of Tradescantia Virginica, L. John M. Coulter and J. N. Rose. (Bot. Gazette, xi., pp. 10-14, one plate.)

These pollen grains were found exceptionally favorable for study; the presence of two nuclei was readily demonstrated, the growth of the pollen-tube watched, and the descent of the nuclei therein observed. The grains were cultivated in a moist chamber, in a hanging drop of a solution of cane sugar. In less than half an hour the pollen-tube begins its development, and may be seen forcing its way through the extine of the grain. The generative nucleus is a large worm-like spindle, and enters the tube some time in advance of the vegetative nucleus.

Superposed Buds. A. F. Foerste. (Bull. Scientif. Lab. Denison University, i., pp. 25-36, one plate.)

An interesting and well-illustrated paper on the morphology of accessory buds, with special reference to those developed vertically above or below the main axillary bud. The first method of arrangement, where the secondary buds appear above the first one developed, is termed *direct* superposition; the second, where they are found below the first bud, *inverted* superposition. Direct superposition is of rare occurrence both in herbaceous and woody plants, but is beautifully shown in the Tartarean Honeysuckle, where the larger principal bud is surmounted by three or four successively smaller ones; also in *Passiflora lutea*, *Coreopsis tinctoria* and *C. tripteris.* Inverted superposition is common in many ligneous and herbaceous plants. Usually the axillary bud first produced reaches a considerable size before a second one appears, and this may be ultimately separated from it for a considerable space by the elongation of the node. Mr. Foerste finds in *Fraxinus viridis*, *F. sambucifolia* and vigorous shoots of *F. Americana*, two buds in the same axil, the lower about one-half the size of the upper. *Cercis Canadensis* has two or three, the lowest often minute and covered by the petiole scar. The hickories have the upper of the two buds excessively developed, the lower remaining insignificant, except in *Carya microcarpa*, where the lower is of larger size. Many other plants are cited. Species in which the upper bud immediately develops into a branch while the lower remains in the bud state are rare in ligneous plants but abundant among herbs. Among those mentioned by Mr. Foerste are *Scrophularia nodosa*, *Gerardia purpurea*, and *Teucrium Canadense.* Later in the season some of these smaller buds may produce branches, as in *Ambrosia trifida.* The flowers and inflorescences of certain species, being homologous with branches, are sometimes superimposed to buds, as in *Delphinium Consolida.* In *Gleditschia triacanthos* the thorn is a specially developed superposed bud. In *Lilium bulbiferum* the bulblets are in inverted superposition to the peduncles.

Botanical Notes.

The Nival Flora of Switzerland: Oswald Heer. (Nouveaux Mem. Soc. Helvét. des Scie. Nat., xxix, part 1.) An interesting summary of the results reached by Prof. Heer in this work, may be found in *Nature*, Vol. xxxiii., pp. 206, 207. From this we learn that 337 species of flowering plants have been observed in Switzerland, at altitudes from 8,000 to 13,000 ft.; twelve of these occur above 12,000 ft. Monte Rosa has the richest Nival flora, but the majority of the species are widely distributed through the Alps. Prof. Heer concluded that about one-half of the plants of the Nival region came from the Arctic zone in the Glacial Period, by way of Scandinavia. The Endemic flora of the Nival region arose in the Alps, and a principal centre of its formation seems to have been the Monte Rosa chain.

Proceedings of the Club.

The regular monthly meeting was held Feb. 9th, at Columbia College, the President in the chair. After the reading of the minutes, Dr. Newberry gave an account of the fossil flora of the cretaceous clays of New Jersey, showing drawings and specimens of many of the species recently found.

It was resolved that Article XII of the Constitution be amended to read: "The Club shall consist of active, corresponding and honorary members," and that the following be added: "Honorary members may be chosen from botanists who have distinguished themselves by valuable original investigations, and shall be limited in number to five."

Dr. Gustavus Ramsperger was elected an active member, and Prof. J. T. Rothrock and Prof. Leo Lesquereux corresponding members.

Mr. Southwick presented the club with a specimen of *Rhus typhina* having beautifully pinnate-pinnatifid leaves.

P. H. Dudley exhibited branches of *Selaginella denticulata*, the lower portions of which had been killed by the growing mycelium of *Polyporus Rodmantii*, (?) saying that the fluid secreted by it was sufficient to penetrate the epidermis of the living branches, causing their death and ultimate decay. When the rootlets beyond the place of contact of the myceelium had not reached the ground, entire branches were destroyed. The mycelium secretes a fluid giving an acid reaction, which softens the fibres of wood, permitting the penetration of the delicate filaments of the mycelium. Wood so attacked, if allowed to dry, cracks and falls to pieces with the so-called "dry rot." Treating the mycelium of this fungus with molybdate of ammonia, abundant crystals of ammonium phosphomolybdate were obtained, showing the presence of phosphorus compounds, which were found to be characteristic of a number of fungi which induce decay in wood. Accompanying the above were vast numbers of bacteria, which also assisted in the decomposition.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XIII.] New York, March, 1886. [No. 3.

The Flora of the Amboy Clays.

By J. S. Newberry.

(Abstract.)

The Amboy clays of New Jersey represent the middle portion of the Cretaceous system, and are equivalents of the Lower Chalk of England. This has been known in a general way for many years, since the clays contain angiosperm leaves, and this botanical group, beginning in the earliest epoch of the Cretaceous age, shows its first considerable development in the Middle Cretaceous; and the green-sands which overlie the clays are full of the mollusks which are characteristic of the Upper Chalk.

The Amboy clays are several hundred feet in thickness, and contain a great number of leaf impressions, which are, to a large extent, different in the different beds. Perhaps a hundred distinct species have been collected from them up to the present time, and it is evident that they hold a very rich and interesting flora. As the clays are of great economic importance, and are likely to be worked at many places, perhaps for hundreds of years, this flora will probably become better known than that of any other geological formation except the Coal Measures. Unfortunately most of the leaf impressions hitherto obtained from the clay pits have proved perishable—a thick sheet of carbonaceous matter occupying the place of the original leaf, and in fresh specimens contrasting beautifully with the light colored clay, but cracking, when dried, to a powder that may be blown off with the breath. For this reason the collections formerly made have been lost, and the study of the flora has been delayed. Within a few years past, however, beds have been found at South Amboy and Woodbridge in which the leaves are represented by a thin film of brown carbonaceous matter, or a coffee colored stain, in which the nervation is distinctly discernible. From these beds Dr. Britton, Mr. Hollick and Mr. I. H. Woolson have obtained many hundred specimens which are permanent and are satisfactory objects of study. These I have lately had under consideration, have had most of them carefully drawn, and of these drawings have composed about fifty quarto plates, some of which I now have the pleasure of exhibiting. This material gives the first satisfactory view of the flora which it represents, and enables me to make this contribution to a knowledge of the vegetation, that flourished in the region about the mouth of the Hudson, in the Cretaceous age.

It will, of course, be a long time before a full description of this flora can be given, but the hundred species of ferns and arborescent plants now before us may probably be regarded as a fair sample of it; and as a flora of similar botanical character has been exhumed from rocks of about the same geological age in the interior of this continent, in Greenland and in Germany, we may infer that this group of plants fairly represents the vegetation of the temperate zone in the Northern Hemisphere at the middle of the Cretaceous age.

As is known to most botanists and geologists, a great change in the plant life of the globe took place at the close of the palæozoic ages. Then the coal flora, consisting of acrogens with some gymnosperms —lycopods, equiseta, and ferns with conifers—gave place to what is known as the *mesozoic flora*, which consisted mainly of cycads, conifers and ferns; the cycads predominating and giving a special aspect to the vegetation. In the Triassic and the Jurassaic ages, and through the first epoch of the Cretaceous age, this flora apparently flourished over the whole world. Toward the middle of the Cretaceous age angiosperms began to appear and soon became the prevailing style of vegetation; this has continued, with many changes of degree but little of kind, to the present day.

The beginnings of the angiospermous flora have apparently been found in the Kome beds of Greenland and in the Potomac group of Virginia, of which the flora is now being studied by Prof. W. M. Fontaine. Here a few angiosperms are found mingled with an abundant flora of cycads, conifers and ferns, but as yet without any discovered transitional forms between these botanical groups.

In the Amboy clays and in the Dakota rocks of the West, which next succeed in time the Potomac clays, the angiosperms are predominant and exhibit a variety and a botanical rank which are surprising. The Dakota flora which has been illustrated in the important memoirs of Mr. Lesquereux and the less voluminous contributions of Prof. Heer and myself, now stands represented by about 200 nominal species, of which 30 are cryptogams and gymnosperms; the remainder are angiosperms. Excluding fragmentary and doubtful material, we have about 140 species which, whatever their botanical relations may be, are certainly distinct from each other; and of these more than three-fourths are arborescent angiosperms.

The flora of the Amboy clays is closely related to that of the Dakota group—most of the genera and some of the species being identical—so that we may conclude they were nearly contemporaneous, though the absence in New Jersey of the Fort Benton and Niobrara groups of the upper Missouri and the apparent synchronism of the New Jersey marls and the Pierre group indicate that the Dakota is a little the older.

At least one-third of the species of the Amboy clays seem to be identical with leaves found in the upper Cretaceous clays of Greenland and Aachen (Aix la Chapelle), which not only indicates a chronological parallelism, but shows a remarkable and unexpected similarity in the vegetation of these widely separated countries in the middle and last half of the Cretaceous age. The botanical character of the flora of the Amboy clays will be seen from the following brief synopsis:

Algæ. A small and delicate form allied to *Chondrites.*

Equiseta and *Fungi.* None yet discovered.

Ferns. Twelve species generally similar and in part identical with those described by Heer from the Cretaceous beds of Greenland and referred to the genera *Dicksonia*, *Gleichenia* and *Aspidium.*

Lycopods. None yet discovered.

Cycads. Two species probably identical with the forms from Greenland described by Heer under the names of *Podozamites marginatus* and *P. tenuinervis.*

Conifers. Fourteen species belonging to the genera *Moriconia*, *Brachyphyllum*, *Cunninghamites*, *Pinus*, *Sequoia*, and others referred by Heer to *Juniperus*, *Libocedrus*, *Frenelopsis*, *Thuya* and *Dammara*. Of these the most abundant and most interesting are *Moriconia cyclotoxon*—the most beautiful of conifers—and *Cunninghamites elegans*, both of which occur in the Cretaceous clays of Aachen, Prussia, and Patoot, Greenland. The *Brachyphyllum* was a large and strong species with imbricated cones eight inches in length.

The angiosperms form about seventy species, which include three of *Magnolia*, four of *Liriodendron*, three or four of *Salix*, three of *Celastrophyllum* (of which one is identical with a Greenland species), one *Celastrus* (also found in Greenland), four or five *Aralias*, two *Sassafras*, one *Cinnamomum*, one *Hedera*, with leaves that are apparently identical with those described by Heer as belonging to *Andromeda*, *Cissites*, *Cornus*, *Dewalquea*, *Diospyros*, *Eucalyptus*, *Ficus*, *Ilex*, *Juglans*, *Laurus*, *Menispermites*, *Myrica*, *Myrsine*, *Prunus*, *Rhamnus*, and others not yet determined.

Some of the Aralias had palmately lobed leaves nearly a foot in diameter—and two of the tulip trees *(Liriodendron)* had leaves quite as large as those of the living species. One of these had deeply lobed leaves like those of the white oak. Of the other the leaves resembled those of the recent tulip tree, but were larger. Both had the peculiar emargination and the nervation of *Liriodendron*.

Among the most interesting plants of the collection are fine species of *Bauhinia* and *Hymenæa*. Of these the first is represented by a large number of leaves, some of which are six or seven inches in diameter. They are deeply bilobed and have the peculiar and characteristic form and nervation of the leaves of this genus. *Bauhinia* is a leguminous genus allied to *Cercis*, and now inhabits tropical and warm temperate climates in both hemispheres. Only one species occurs in the United States, *Bauhinia lunarioides*, Gray, found by Dr. Bigelow on the Rio Grande.

Hymenæa is another of the leguminosæ and inhabits tropical America. A species of this genus has been found in the Upper Cretaceous of France, but quite different from the one before us, in which the leaves are much larger, and the leaflets are united in a common petiole, which is winged; this is a modification not found in the living species, and one which brings it nearer to *Bauhinia*.

But the most surprising discovery yet made is that of a number of quite large helianthoid flowers which I have called *Palæanthus.* These are three to four inches in diameter, and exhibit a scaly involucre enclosing what much resembles a fleshy receptacle with achenia. From the border of this radiate a number of ray florets, one to two inches in length, which are persistent and must have been scarious like those of *Heliochrysum.* Though these flowers so much resemble those of the *Compositæ*, we are not yet warranted in asserting that such is certainly their character. In the Jurassic rocks of Europe and India some flowers not very unlike these have been found, which have been named *Williamsonia* and referred to cycads by Carruthers. A similar fossil has been found in the Cretaceous rocks of Greenland and named by Heer, *Williamsonia cretacea*, but he questions the reference of the genus to the *Cycadeæ* and agrees with Nathorst in considering all the species of *Williamsonia* as parasitic flowers allied to *Brugmansia* or *Rafflesia.* The Marquis of Saporta regards them as monocotyledons similar to *Pandanus.* More specimens of the flowers now exibited will perhaps prove, what we can now only regard as probable, that the *Compositæ* like the *Leguminosæ*, *Magnoliaceæ*, *Celastraceæ*, and other highly organized plants formed part of the Cretaceous flora. No composite flowers have before been found in the fossil state, and as these are among the most complex and specialized forms of florescence, it has been supposed that they belonged only to the recent epoch, where they were the result of a long series of formative changes.

The presence of *Hymenæa*, *Bauhinia* and *Cinnamomum* might be considered as proof that the climate in which these plants grew was tropical, but the willows, magnolias, aralias and other elements in the flora are rather indicative of a warm temperate climate.

No palms have yet been found in the lower or middle Cretaceous, though they are abundant in the upper Cretaceous and Tertiary beds in localities far north of New York. We may therefore infer that when the Amboy clays were deposited palms had not yet appeared in the vegetation of the globe.

A large number of fruits have been found in the Amboy clays, but with the exception of those which belong to the conifers and cycads their botanical relations are not yet clearly made out.

On the Nomenclature of the Leaves of Fossil Dicotyledons.*

In Vol. xxv., Nos. 1 and 2, of the "Botanisches Centralblatt," A. G. Nathorst publishes an interesting article in which he discusses the difficulties which present themselves to the palæontologist in classifying and naming fossil dicotyledons on the characters of their leaves only.

The author proposes the following methods which he intends to employ in his future publications, and invites his co-workers in this field to adopt the same rule, viz. :

Those species of which leaves only are known, are to be named after the genus with which they agree best, with the addition of the termination—*phyllum.* Therefore, we ought not to say *Magnolia Capellini, Heer.*, but *Magnoliphyllum Capellini*, etc. Such a name would indicate that the leaf in question seems to resemble most the leaves of a *Magnolia*, and therefore possibly belongs to that genus. If afterwards, together with this leaf, flower and fruit should be found, which, without any doubt, belong to Magnolia, the leaf could then be classified with Magnolia. In the case of leaves for which analagous forms are not to be found among living plants, independent generic names are to be used, as heretofore, e. g., *Credneria*, *Protophyllum*, etc.

Another part of the article refers to the identification of fossil leaves found in different localities, at great distances from each other. In most such cases slight differences in form, etc., are, at present, not taken into consideration, and the leaves are placed in the same species. Thus the leaf A is identified with the leaf B (from a distant locality), afterward C with B, then D with C, and finally D with A ; in reality, the name of this supposed single species may possibly stand for a whole group of species.

In order to meet this difficulty the author proposes to employ a ternary nomenclature. Suppose a leaf were found in Japan which resembles *Acer trilobatum* so much that it would not be advisable to make a new species of it, although the similarity is not perfect ; this leaf ought to be called *Acer trilobatum Japonicum.*

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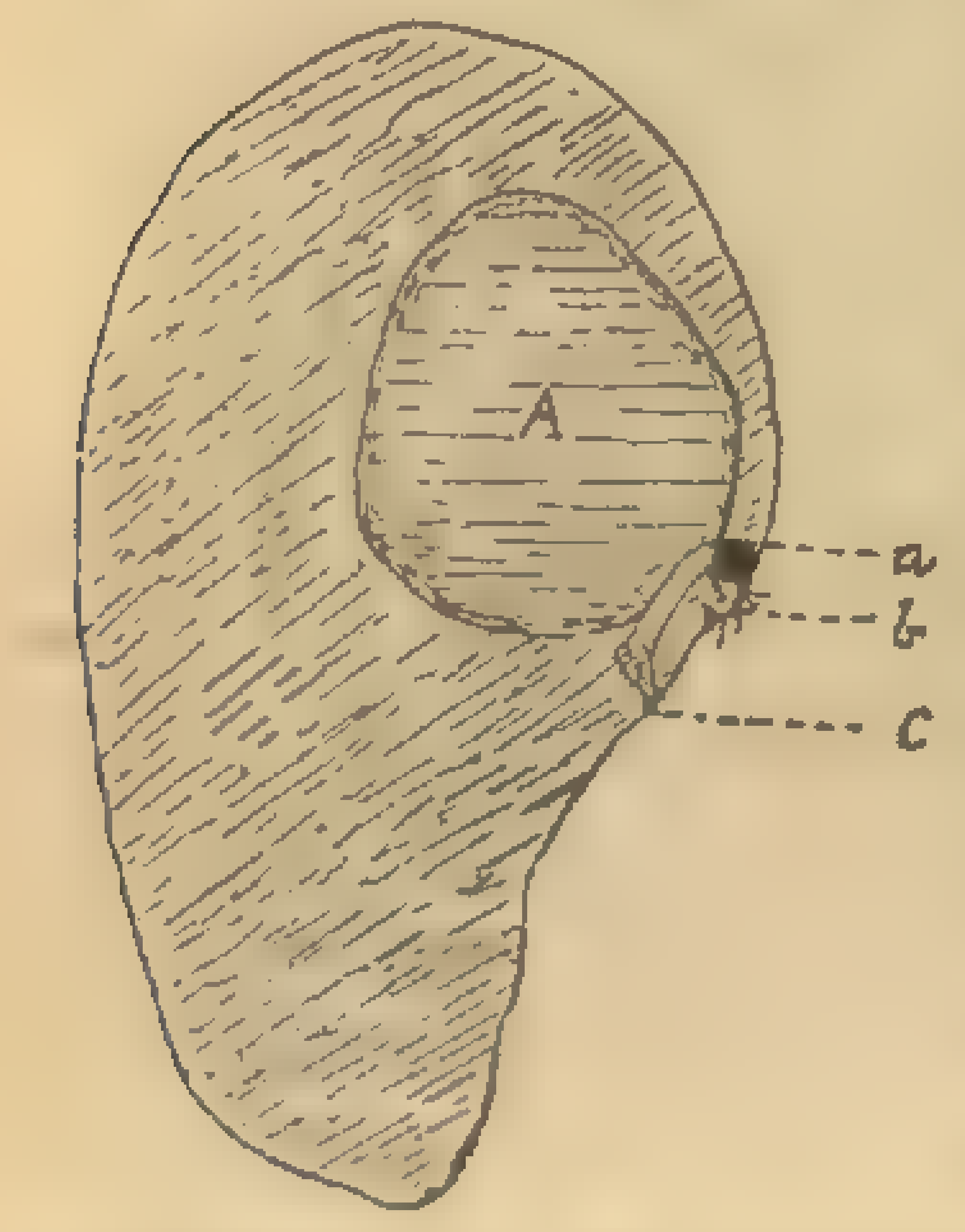
* Abstracted by Professor Jos. Schrenk.

A Curious Potato.



A curious freak of nature is shown in a potato brought to me two years ago by Mr. Victor Shinn. One of the "eyelets" had grown; the shoot entered the substance of the potato at once after a sudden curve, and there gave rise to another potato, perfect in every respect, covered with a thin epidermis, but without "eyelets." The surrounding tissues of the larger tuber, however, were not supplied with such an epidermis. I have noticed that the latter feature is also presented when roots and shoots of other plants grow through the substance of a potato. After giving rise to the potato, the shoot passed for a slight distance beneath the surface of the old potato, and had already produced a slight opening in the skin on its way out when its vigor was probably lost and it seems to have ceased growth. The small potato, however, attained quite a fair size.

Description of the figure: A, the smaller potato; a, the place of attachment to the ingrowing shoot; b, the origin of this shoot at the eyelet; c, the opening at which it reappeared.

A. F. Foerste.

Notes from Schenectady, New York.

In 1884, the first summer of my residence here, when taking a walk along the Mohawk River, I discovered on the "sand-bank," between the New York Central and Hudson River Railroad and the well-known Sander's Lake, a grass, *Bouteloua racemosa*, Lag., (*B. curtipendula*, Gray), whose distribution is mainly from Illinois to Texas and Arizona. The form of my specimens is, however, more slender and taller than those from the West. A steep sandy bank was perfectly covered with the purplish drooping spikes of this new comer, among other grasses and *Asparagus officinalis*, L. The rare *Panicum xanthophysum*, Gray, abounds in the shady pine groves of the town of Rotterdam. *Aster amethystinus*, Gray, grows along roadsides in Reesville. *Trapa natans*, the water-chestnut of Europe, was planted in Sander's Lake, and grows there luxuriantly.

J. H. Wibbe.

Note on Quercus Muhlenbergii, Engelm.

Quercus Muhlenbergii is the name proposed by Dr. Engelmann in 1877[*] for the oak originally described by Muhlenberg and Willdenow[**] as *Q. Castanea*, known to Michaux[†] as *Q. Prinus*, var. *acuminata*, and generally regarded as a variety of *Q. Prinus* by other authors, up to the time of Dr. Engelmann's paper. That it is distinct enough from the common chestnut oak of the Eastern States, all are at present agreed.

The relation of the species under consideration to the *Q. prinoides*, Willd.[‡] seems, however, more obscure. The latter was formerly regarded by Dr. Gray as a variety of *Q. Prinus*, and in his manuals is recognized as *Q. Prinus*, var. *humilis*, Marshall. In his last appendix, however, he considers it a distinct species under Willdenow's name. Professor Wood, in his Botanist and Florist, calls it *Q. Prinus*, var. *prinoides*, but in his class-book, *Q. prinoides*, Willd.

That it is more nearly allied to *Q. Muhlenbergii*, than to *Q. Prinus*, however, is plainly indicated in its nearly or quite sessile thin cup, with small globose acorn. Dr. Engelmann was, indeed, inclined to unite it with his *Muhlenbergii*, and in this he has been followed by Mr. Sargent,[§] who says: "a tree twenty-four to thirty, or exceptionally thirty-nine meters in height, with a trunk 0.6 to 0.9 meter in diameter (*Q. Muhlenbergii*), or often, especially toward the eastern and western limits of its range, reduced to a low, slender shrub, (*Q, prinoides*); rare as a tree east of the Alleghany Mountains; very common in the Mississippi River basin, and reaching its greatest development in southern Arkansas."

The typical, arborescent, *Q. Muhlenbergii* is known to Professor Porter in five widely separated stations in Pennsylvania, all on limestone soil; he has found it also on the blue Lower Silurian Limestone below Phillipsburg, N. J. I have observed it on sandy soil in the vicinity of Bridgeton, Cumberland Co., and young trees on the white, crystalline limestone of Stirling Hill, Sussex Co., N. J., these three localities being the only ones at present known to me in New Jersey. The *Q. prinoides*, Willd., is widely and plentifully distributed through southern and southeastern New Jersey, where it is seldom over four feet high, and commonly fruits at six inches from the ground, occurring also in less abundance in the mountains of the northern part of the State, where it grows somewhat larger and stronger, reaching a height of eight or ten feet about Waterloo, Sussex Co. Prof. Porter has informed me that it has a wide range in Pennsylvania. It is found on Long Island, and extends northward along the coast to Massachusetts. All the numerous specimens which I have examined show a remarkable persistence of leaf and fruit characters, and if it were not assured us on the highest authority that the bushy form passes gradually into the tree in the West, I should not be at all inclined to regard them as the same species. However, as this appears to be the case, I hold that our eastern, shrubby form, is, at least, a well marked variety of Dr. Engelmann's species, and propose for it the name *Quercus Muhlenbergii*, Engelm., var. HUMILIS.

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[*] *Trans. St. Louis Acad. Sci.*, iii, 591.

[**] *Neue Schriften Gesell. Nat. Fr.*, Berlin, iii, 396.

[†] *Hist. Chênes Amer.*, No. 5, t. 8.

[‡] *Loc. cit.*, 397.

[§] *Rep. on Forests of N. A.*, Vol. ix, 10th Census U. S., 142, 143.

N. L. BRITTON.

Index to Recent American Botanical Literature.

Adventitious Inflorescence of Cuscuta glomerata known to the Germans. C. E. Bessey. (Amer. Nat., xx., pp. 278–279).

Referring to notes on this interesting subject presented by him at the Philadelphia and Ann Arbor meetings of the American Association, Prof. Bessey remarks that the matter had previously been described in Dodel-Port's Atlas der Botanic. Dr. Dodel-Port, after describing the normal branching, says in substance: "Besides the normal branching there is a copious formation of adventitious shoots. These are formed endogenously upon the best nourished parts of the Cuscuta stem, and also upon the parts which bear the haustoria, where the host-plant and the parasite are in immediate contact. The rudimentary shoot-buds are formed beneath the cortex of the Cuscuta stem, and break through in a manner similar to the lateral roots of vascular plants. They develop either into inflorescences, or upon injury to the rest of the plant, into vegetation shoots."

Anemonella thalictroides, Spach. Asa Gray. (Botan. Gazette, xi., p. 39.)

Dr. Gray adopts the above name for our common Rue Anemone, which was called *Thalictrum anemonoides*, Michx., in his Manual, and *Anemone thalictroides*, L., by Professor Wood. The terminal depressed-sessile stigma is foreign to both *Anemone* and *Thalictrum*, and constitutes the principal distinguishing mark of Spach's genus *Anemonella.*

Arctic Grasses. F. Lamson Scribner. (Botan. Gazette, xi., pp. 25-26, one plate.)

Professor Scribner records the discovery of *Deschampsia brevifolia*, R. Br., by Lieut. Greely near Fort Conger, Grinnell Land, in 1882, and regards it as of specific rank and not a variety of *D. cæspitosa*, Beauv.; it was also collected on Schumagin Island, Alaska, by M. W. Harrington, in 1871-72. *Phippsia algida*, R. Br., a curious little species, hitherto not known south of Alaska, was obtained about Chicago Lake, Georgetown, Colo., by H. N. Patterson, during the past season. *Agropyrum violaceum*, Hornem., was collected by Lieut. Greely at Fort Conger, and at Upper Marias Pass, Montana, by Wm. M. Canby, in 1883. Figures of the three species are given.

Botanical Notes. Mary K. Curran. (Bull. Calif. Acad. Sci., i., pp. 272-275.)

Referring to a classification of the *Eriogoneæ* as affected by some connecting forms, the genus *Nemacaulis* is referred to *Eriogonum* and a new section of the latter genus, to be called *Bracteolata*, is proposed, to contain species whose flowers within the involucre are each subtended by a spatulate bract. *E. gossypinum*, n. sp., is described. A new *Chorizanthe* (*C. insignis*) is characterized, as well as two new varieties of previously known species of this genus.

Botany of California and Parts adjacent.—Studies in the. Edward Lee Greene. (Bull. Calif. Acad. Sci., i., pp. 179-228 and 276-282.)

Three new genera, *Bebbia* of the *Compositæ*, containing two species, *B. juncea* (*Carphephorus junceus*, Benth.) and *B. atriplicifolia* (*Carphephorus atriplicifolius*, Gray), *Mimet-*

anthe, of the *Scrophularinæ*, consisting of *M. pilosa* (*Mimulus pilosus*, Watson) and *Clevelandia*, also of the *Scrophularinæ*, with a single species, *C. Beldingii* (*Orthocarpus Beldingii*, Greene), are proposed. Fifty-six new species are then described, with critical notes on many others, some of which are referred to genera other than those where they have hitherto been placed. Under the heading, "Notes on Guadalupe Island," Mr. Greene gives a general account of its flora, and a list of species hitherto found on the island, there being fifteen additions to Mr. Watson's list published in the Proceedings of the American Academy in 1876.

The second part of Mr. Greene's contribution gives a Revision of the genus *Myosurus*, which has already been criticized by Dr. Gray in the January number of this BULLETIN. *Blepharizonia* is a new genus in which are included *B. plumosa* (*Hemizonia plumosa*, Gray,) and *B. laxa* (*Hemizonia plumosa*, var. *subplumosa*, Gray.) Four new species are here characterized.

Cimicifuga racemosa, Ell. (Drugs and Medicines of N. A., i., pp. 273-288, concluded.)

The medical history and physiological action of the drug are given in this number.

Clintonia Andrewsiana, Torrey. (The Garden, xxix., p. 109.)

This Californian plant flowered in the Edinburgh Rock Garden during 1885, and information is desired by a correspondent of the above with regard to its cultivation. We believe it has never been figured.

Eastern Virginia.—Notes on the Flora of. Lester F. Ward. (Botan. Gazette, xi., pp. 32-38.)

Flora of the Peruvian Andes, with remarks on the History and Origin of the Andean Flora.—Contributions to the. John Ball, F. R. S. (Journ. Linn. Soc., xxii., pp. 1-64.

Professor Ball devotes twenty-seven pages of this communication to general considerations regarding the Flora of the region. *Compositæ* are specially abundant, 50 of the 214 species collected in the upper valley of the Rimac River belonging to that order. In the enumeration of the plants collected, twenty-five new species and varieties are characterized, among them the only *Sedum* (*S Andinum*) hitherto found in South America.

Fremontia Californica. (The Garden, xxix., p. 8.)

A colored plate is given of this showy Californian shrub, which is abundant in the foot-hills of the Sierra Nevada. In England it is commonly grown against walls, and in such positions flowers freely and ripens seeds.

Fungi of the Pacific Coast. IV. H. W. Harkness. (Bull. Calif. Acad. Sci., i., pp. 256-271.)

A further enumeration of Californian species, including list of forms new to science, described in *Grevillea* during the past year.

Garden Lettuce—a Study of. E. L. Sturtevant. (Amer. Nat., xx., pp. 230-233.)

At the New York Agricultural Experiment Station, in 1885, eighty-three varieties of lettuce were grown under nearly two hundred names. These present three distinct form-species—the lanceolate-leaved, the "Cos," and "cabbage." Mr. Sturtevant gives evidence which supports the hypothesis that these form-species have originated from wild forms which have been brought into cultivation in different regions, and hence have different origins. Lettuces are supposed to have been grown by the Persians some five hundred years before Christ, and to have been introduced into China between the years 600 and 900 of our era; they were mentioned by Chaucer in England in the fourteenth century, and reached America with Columbus.

Hookera v. Brodiæa. James Britten. (Journ. Bot., xxiv., pp. 49-53.)

It is shown that the first of these generic names must supplant the second for this beautiful liliaceous genus. *Hookera* was proposed by Salisbury (Parad. Lond, t. 98), more than a month before Smith's paper establishing *Brodiæa* was read (Trans. Linn. Soc., London, x., 2, t. 1). It was named for William Hooker, the artist who planned and illustrated the "Paradisus Londonensis." Mr. Britten remarks that the plants placed under *Brodiæa* by Mr. Sereno Watson in his Revision of the North American Liliaceæ, must take the generic name *Hookera*, but may retain their specific names. The orthography of *Hookera* is too close to *Hookeria*, a genus of mosses, but the former has again priority of publication, so that if either is to be rejected for this reason, it must be the bryological genus.

Jamaica Ferns of Sloane's Herbarium. G. S. Jenman. (Jour. Botany, xxiv., pp. 33-43, concluded.)

An enumeration of the plants contained in this old collection, with interesting notes on many of them. A new species, *Hymenophyllum Houstonii*, is here first described.

Linnæus—The Life and Labors of. A. P. Morgan. (Botan. Gazette, xi., pp. 26-32.

Nelumbium luteum. R. Irwin Lynch. (The Garden, xxix., p. 3.)

It is remarked that the seeds of this plant will germinate in a few days if the testa is cut through.

Ranunculaceæ.—A new genus of. Edward Lee Greene. (Bull. Calif. Acad. Sci., i., pp. 337-338.

It is proposed to refer *Ranunculus hystriculus*, Gray, to the genus *Kumlienia*, dedicated to Prof. T. L. Kumlien, on account of its terete seed and thin, bladdery pericarp, the latter character being foreign to all other *Ranunculi*. Mr. Greene remarks that his new genus is nearest *Trautvetteria*, the fruit-structure of which is similar.

Salvinia natans. (Botan. Gazette, xi., p. 48.)

Specimens of this plant, whose occurrence in the United States has hitherto been doubtful, have recently been collected by Mr. C. H. Demetrio in a bayou of Bois Brulé Creek, Perry Co., Missouri, but whether native or of accidental introduction, is yet uncertain.

Synoptical Flora of North America: The Gamopetalæ, being a second edition of Vol. i., Part ii., and Vol. ii., Part i., collected. Supplements and Indexes. Asa Gray. Published by the Smithsonian Institution, January, 1886.

The two published parts, each with a supplement, are now issued in a single volume. Both have been corrected, as far as could well be done on the electrotype plates. The supplement to Vol. i., Part i., (*Rubiaceæ—Compositæ*) is of eleven pages; that of Vol. ii., Part i., (*Ericaceæ—Plantaginaceæ*) is seventy pages long. A tabular enumeration of all the gamopetalous genera and species is appended. The indexes of each part have been made anew. In the supplement to Vol. i., Part ii., p. 448, *Dimeresia*, a new genus of *Compositæ*, is described, consisting of a single species, *D. Howellii*, from Southeast Oregon. Greene's genus *Bebbia* is accepted. Twelve new species are described in this supplement. In that to Vol. ii., Part i., thirty new species and numerous varieties are characterized. A number of the genera are entirely revised. From the tabular arrangement of the Gamopetalæ we learn that there are now 1,783 indigenous North American species, and 102 introduced, mainly from the Old World. The supplements and indexes in pamphlet form have been issued separately from the volume.

Synthyris reniformis, Benth. (Curtis's Bot. Magazine, xlii., Tab. 6,860.)

Timber Culture in Wisconsin. F. W. Woodward, (Gard. Month., xxviii, p. 82).

Fraxinus viridis, Michx, thrives best at Eau Claire, 44° N.; *F. Americana*, L., planted in the spring of 1884, is now 7 ft. high and 2 inches in diameter, and *Catalpa speciosa*, Warder, planted the same year, also attained 7 ft. in height and 2½ inches in diameter.

Tumble-weed. C. E. Bessey. (Botan. Gazette, xi., p. 41.)

Upon the plains and prairies of the West our common weed *Amarantus albus* grows into a compact plant whose stout, curving branches give it an approximately spherical form. The autumn winds break the main stem near the ground, and the upper part goes rolling and tumbling before the wind, often for miles. This is an excellent illustration of the effect of climate on the physical development of the plant body, as in the East the species is a straggling herb, remaining rooted long after its death at the close of the season. Dr. Newberry has told us that it is also known as the "ghost-plant" in allusion to the same habit, bunches flitting along by night producing a peculiarly weird appearance. It is doubtless very efficient in the distribution of the seeds, and accounts for the wide dissemination of the species on the plains. Professor Bessey notes a similar habit in *Baptisia tinctoria* on Martha's Vineyard, Mass., and *Panicum capillare* might also be cited as another example.

Wild Flowers under Cultivation. Ernest Volk. (Journ. Trenton Nat. Hist. Soc., i., pp. 9-16.)

Remarkable success was attained in growing *Lilium Cana-*

dense, L., and *L. superbum*, L., the latter averaging a height of ten feet, with clusters of more than fifteen flowers. The following were also successfully cultivated: *Chrysopsis Mariana*, Nutt.; *Lobelia cardinalis*, L.; *Chelone glabra*, L.; *Gentiana Andrewsii*, Griseb., and *Helenium autumnale*, L.; but failure has attended all efforts to raise *Gerardia purpurea*, L., either from root or seed, owing, probably, to its partially parasitic habit.

Xanthorrhiza apiifolia, L'Her. (Drugs and Medicines of N. A., i., pp. 289-304; Pl. xxv., figs. 99-105; with Index and Title Page to Vol. i.)

An interesting discussion of the various names by which this plant has been known, follows the botanical description. The authors discredit L'Heritier's name, and claim precedence for that of *X. simplicissima*, Marshall (Arbust. Amer., p. 168,) holding also that the genus is more closely allied to the *Berberidaceæ*, and is at present wrongly classed. The statement is made that the rhizomes are so nearly like those of *Berberis repens* and *B. aquifolium*, that they could be substituted in commerce. Furthermore, G. D. Perrins demonstrated, in 1862, that the yellow coloring matter, which gives *Xanthorrhiza* its intensely bitter taste, was berberine, and subsequent investigations have failed to discover any other alkaloid.

Botanical Notes.

A new Algological Journal.—The publication of a periodical devoted to Algæ, under the title Notarisia Commentarium Phycologicum, has been begun in Venice, Italy, under the editorship of Messrs. G. B. DeToni and David Levi. Systematic descriptions and illustrations of Mediterranean forms are commenced in the first number, and much other matter of interest to Algologists is presented.

A new Work on Hepaticæ.—Mr. Gotthold Hahn has recently published a small handy volume on the Liverworts of Germany, entitled "Die Lebermoose Deutschlands." 133 species are described and 90 of them figured on twelve beautifully colored plates. By comparing the species with Professor Underwood's Catalogue of North American Hepaticæ we find that over 100 of these are represented in America. The book will therefore prove valuable to American students of this interesting but neglected order of plants.

The Testa of Leguminous Seeds.—In addition to the list of authors on this subject given by Mr. L. H. Pammel in the last number of the BULLETIN, I would mention F. A. Flückiger, Pharmacognosie des Pflanzenreiches, 1883, and W. Marmé, Lehrbuch Pharmacognosie, 1886. These books contain elaborate accounts of the histology of the Calabar bean, and also of fenugreek (*Trigonella fænumgræcum*, L.,) the testa of which has a structure very similar to that of Physostigma.

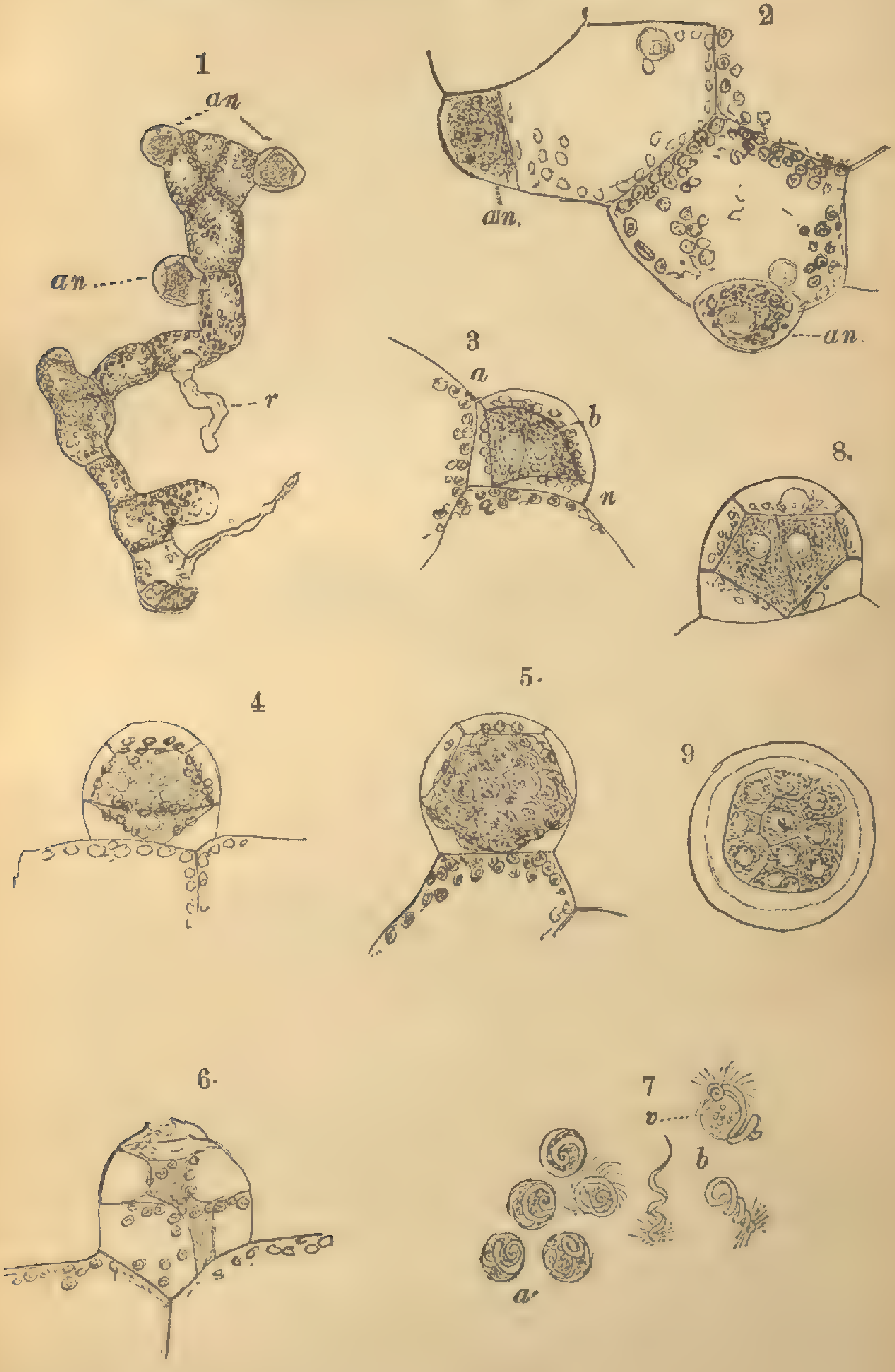
J. S.

Proceedings of the Club.

The regular monthly meeting was held at Columbia College, Tuesday evening, March 9th. The President occupied the chair, and twenty-nine persons were present. The following were elected active members: Miss Lena T. Potter, Edward B. Miller and Henry C. Carter. Dr. Asa Gray was elected an honorary member under the amendment to the Constitution adopted at the last meeting. Prof. Charles E. Bessey, Dr. O. R. Cross and Miss Eliza Youmans were elected corresponding members. It was resolved to permanently deposit the Library of the Club in the Botanical Library of Columbia College, in exchange for which the members have now the privilege of obtaining readers' tickets to this and the main College Library on application to the Librarian of the Club.

Specimens of the Snowdrop, *Galanthus nivalis*, which had blossomed in a garden in Brooklyn, were brought by Miss Steele. Mrs. Britton read the paper announced for the evening, entitled "Notes on the Autumn Flora of the Great Appalachian Valley and the Southern Alleghanies," and illustrated it with numerous specimens. A photograph of Louis D. de Schweinitz, sent by Eugene A. Rau, of Bethlehem, Pa., through whom the de Schweinitz library has recently been sold, was exhibited.

The committee on Public Lectures announced that Prof. W. G. Farlow, of Cambridge, Mass., will address the Club and its friends on Friday evening, April 9th. The title will be announced by card.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Development of the Antheridium in Ferns. D. H. Campbell.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XIII.] New York, April, 1886. [No. 4.

The Development of the Antheridium in Ferns.

BY DOUGLAS H. CAMPBELL.

Plate LIV.

In a paper read before the last meeting of the American Association for the Advancement of Science, I called attention to the readiness with which the prothallia of ferns may be grown, and their value as types in the study of development. In the present paper I have endeavored to give a few hints in regard to the study of the antheridium, suggested by a somewhat extended study of a number of species.

In selecting species for study, it is best to choose those that are diœcious, or else to study the young prothallia of the monœcious species; as in the larger monœcious prothallia, longitudinal sections are necessary, while in the small male prothallia of such diœcious forms as *Asplenium filix-fœmina*, for instance, they may be studied by placing the whole prothallium upon the slide.

The observations here recorded were made principally upon the latter species and the two species of *Onoclea*, *O. Struthiopteris* and *O. sensibilis*, all of which are almost absolutely diœcious, and do not differ in any essential particulars in the formation of the antheridium.

The best results are obtained by growing the prothallia artificially, as it is very rare to find them growing naturally, and it is a very simple matter to grow them. The spores germinate in from three days to a week from the time they are sown, and are ready for study in about six weeks time, when under favorable circumstances abundance of ripe antheridia may be observed. The best results were obtained by sowing the spores in fine earth and keeping moist, and somewhat shaded, a bell-jar being used to prevent too rapid evaporation. Care must be taken.

however, not to keep the ground soaking wet, or else there is danger of the prothallia rotting.

The young male prothallia are small, and often of irregular form (Fig. 1), the antheridia (*an.*) arising from the marginal, or sometimes the terminal cells. They arise as papillae, resembling very much at this stage, the young root hairs, but soon become distinguished by their denser contents, and more regularly hemispherical form (Fig. 2, *an.*)

The young antheridium now becomes cut off from the cell of the prothallium by a wall, and is seen to contain a distinct central nucleus, around which the contents are more granular than in the peripheral portions of the cell. Among the granules are some chlorophyll bodies, but these are smaller than those of the other cells of the prothallium.

The first wall formed within the antheridium is funnel-shaped in most cases, the broad portion being directed upward, and the point in contact with the wall by which the antheridium was cut off from the cell of the prothallium (Fig. 3, *a-n*). Sometimes before this is differentiated a wall is formed parallel to the latter, thus making a pedicel, but this was quite exceptional. In some cases the point of the funnel-shaped wall does not reach to the base of the antheridium, or the wall may even be nearly flat.

The second wall (Fig. 3, *b*) is much less variable, being approximately hemispherical, and parallel to the outer wall of the antheridium.

Finally a third wall is formed, resembling the first one in form, and cutting off the covering cell of the antheridium (Figs. 4, 8.)

The antheridium now consists of four cells, three parietal and a central cell. The two lower parietal cells are annular in form, the upper one flat. They all are nucleated and contain a number of small chlorophyll granules. The central cell appears pentagonal when seen from the side, and is characterized by a large nucleus and dense, granular and highly refractive protoplasm.

The division of the central cell begins either before, or immediately after the formation of the covering cell. The first wall (Figs. 3, 8) is nearly vertical, and is soon followed by a second vertical one at right angles, so that when the antheridium is seen from above the central cell appears divided into four, arranged like the quadrants of a circle. These are followed by others until the full number, varying a good deal, even in the same species, is formed.

The central cell now consists of a tissue composed of small, thin-walled polyhedral cells, each one having a small but distinct nucleus. The antherozoids are derived directly from the nucleus, which, previous to their formation, becomes indistinct, but does not actually disappear. As soon as it can be definitely observed again, it is seen to have increased in size and to have become curved (Fig. 9.) It rapidly increases in size, becoming at the same time more curved, until it finally comes to occupy nearly the whole cell, some granular protoplasm, however, remaining between the coils, especially toward the centre of the cell. When the antherozoids are fully grown, the sperm-cells have increased in size so as to crowd upon the parietal cells, and occupy nearly the whole space of the antheridium, which is now nearly globular (Fig. 5.)

The walls between the sperm-cells now undergo a change, becoming mucilaginous, so that when water is applied they dissolve, allowing the antherozoids to become separated, but enough of the wall remains, so that they are still enclosed in a delicate membrane. The dissolution of the division walls is accompanied by very evident movements of the contents of the antheridium.

When the antherozoids are ready to escape, the parietal cells absorb water with great avidity, until the pressure becomes so great as to rupture the wall of the antheridium. This usually occurs between the middle and top cell, the latter being torn open ; or sometimes simply through a fissure in the cap-cell. As the parietal cells absorb the water they become very much distended, pressing in on the mass of sperm-cells, which are thus forced out through the opening. In cases where the first wall in the antheridium did not extend to the base, it was forced up by the absorption of water in the cell beneath, so as to nearly obliterate the cavity of the antheridium.

The antherozoids remain for a few moments after their escape enclosed in the remains of the wall of the mother-cell, but this is soon ruptured and the antherozoid swims rapidly away, dragging after it the remains of the contents of the mother-cell as a very delicate vesicle (Fig. 7, *v.*)

The body of the antherozoid is coiled, the coils toward the posterior end being larger. It is generally somewhat flattened at the anterior end, where there are numerous cilia, and more or less pointed at the other, which may be drawn out into a long, delicate filament.

After the escape of the antherozoids the inner walls of the antheridium (Fig. 6) soon assume a dark brown color.

In the preparation of specimens for study, very little use was made of reagents, most of the work being done with living specimens mounted simply in water.

EXPLANATION OF FIGURES.

Fig 1. Small male prothallium of *Asplenium filix-fœmina*; × 150. *An*, antheridia; *r*, root hair.

Figs. 2-5. Successive stages in the development of the antheridium of the same; × 500. All except Fig. 4 in optical longitudinal section.

Fig. 6. An empty antheridium of the same; × 550.

Fig. 7. Antherozoids of the same; *a*, before, *b*, after escaping from the mother-cells, × 625; *v*, vescicle:—remains of the central contents of the mother-cell.

Fig. 8. Young antheridium of *Onoclea sensibilis*. Optical section from the side; × 500.

Fig. 9. An older one of the same species from above; × 500.

New American Grasses.

BY GEORGE VASEY.

ARISTIDA REVERCHONII, Vasey.—Culms slender, 1 to 2 feet high, unbranched, smooth; radical leaves 3 to 6 inches long, involute filiform, straight or curved; culm leaves about 3, rigid, erect, filiform and involute, 3 to 6 inches long; ligule a ciliate line; sheaths smooth, close, shorter than the internodes; panicle erect, spike-like, slender, 4 to 6 inches long; the branches appressed and sessile, single and alternate, the lower ones 1 to 1½ inches long, all closely flowered, and longer than the internodes;

glumes narrow, acute, purplish, the lower 4 lines, the upper 5 to 5½ lines long; flowering glume as long as the upper empty glume, or slightly longer; awns about equal, 7 to 8 lines long, spreading. Differs from *A. purpurea*, Nutt., in the narrower, denser panicle, with sessile branches, smaller flowers and shorter awns. Collected by Reverchon on rocky hills in Crocket County, Texas.

STIPA LETTERMANI, V.—Culms 1 to 2 feet high, slender; radical leaves filiform, 4 to 6 inches long; ligule short; panicle spike-like, narrow, slender, 4 to 6 inches long, loose; lower rays 1 to 1½ inches long, erect, mostly single, sparsely flowering nearly to the base, upper branches shorter; outer glumes about 3 lines long, acuminate and awn pointed, both three-nerved; flowering glume about 2 lines long, sparsely pubescent, the hairs long near the summit, awn bent, 6 to 8 lines long. One of the smallest flowered species; collected in Idaho by Prof. G. W. Letterman.

MUHLENBERGIA PARISHII, V.—This species was described in the Bot. Gazette, for August and September, 1882, page 93, as *M. sylvatica*, var. *Californica*. I am now satisfied that it is a good species and name it for the collector, Mr. S. B. Parish, of San Bernardino. Cal.

MUHLENBERGIA CALIFORNICA, V.—This was described, on page 92 of the same number of the Bot. Gazette, as *M. glomerata*, var. *brevifolia*. It is sufficiently distinct to constitute a good species.

MUHLENBERGIA WRIGHTII, V.—Culms erect or decumbent, usually branching below, 1 to 2½ feet high, somewhat compressed, rather wiry; leaves short and somewhat stiff, 3 to 6 inches long; sheaths smoothish, shorter than the internodes, ligule short; panicle spike-like, cylindrical, densely flowered, more or less interrupted; the lower branches are, on thrifty specimens, ½ to 1 inch long, appressed and floriferous to the base; spikelets frequently two-flowered; outer glumes nearly equal, about 1 line long, with a thin ovate base, and an awned point as long or longer, or sometimes lanceolate with a shorter point; flowering glume a little longer and thicker than the outer ones, tipped with a short, stiff awn, ⅓ to ½ line long, three-nerved below, slightly pubescent; the palet about as long as its glume.

Throughout the Rocky Mountain region. It is No. 1986, C. Wright; 806, M. E. Jones; 3177, J. G. Lemmon, etc. Mr. Lemmon found a form which he says grows in ring-like patches.

AGROSTIS DEPRESSA, V.—Culms decumbent and geniculate at the base, becoming erect, 6 to 10 inches high, slender, leafy below; leaves short and narrow, plain, 1 to 2 inches long, ½ line wide, acute; ligule conspicuous, about 1 line long, obtuse and ciliate at apex; sheaths smooth, striate, the lower ones loose; panicle narrow, 1 to 2 inches long, or in age broader and more spreading; the branches short, variable in number, 2 to 5 at the lower joints and unequal; pedicels scabrous, about as long as the spikelets; empty glumes nearly equal, about 1 line long, ovate-lanceolate, acute, roughish on the keel above; flowering glume one-third shorter, narrowly oblong, obtuse or minutely dentate at the apex; palet narrow, half as long as its glume. Collected in Clear Creek Canon, Col., by H. N. Patterson, 1885.

AGROSTIS EXARATA, var. STOLONIFERA, V.—Cæspitose; culms 8 to 12 inches high from a decumbent base, with numerous short leaves, which are seldom more than an inch long, narrow, acuminate; the radical leaves also short and abundant; ligule membranaceous, conspicuous, obtuse; panicle 1½ to 2 inches long, purplish, narrow; branches very short and clustured, mostly flowering to the base, some of the lowest longer and naked below; spikelets about 1 line long, sometimes two-flowered; empty glumes nearly equal, acute, hispid on the keel; flowering glumes one-third shorter, oblong ovate, toothed at the apex, sometimes with a short awn, palet small, equaling the ovary; long leafy stolons, sometimes a foot long, are often emitted from the base, the joints 1 to 2 inches apart. Bottom lands of the Columbia River, collected by Mr. W. N. Suksdorf. Perhaps a good species.

AGROSTIS EXARATA, var. LITTORALIS, V.—Culms erect from a creeping rhizome, 10 to 16 inches high, stout, with about four nodes; leaves erect or appressed, rather rigid, the upper one near the panicle, varying from 2 to 4 inches long, about 1 line wide below, narrowed to a long point, scabrous on the margins, ligule conspicuous, obtuse, membraneous; panicle rigidly erect, narrow, lanceolate, densely flowered, the branches unequal and numerous, the shorter floriferous to the base, the lower ones (about ½ inch) nearly so; spikelets about 1½ lines long, empty glumes lanceolate, acute, membraneous on the margins; flowering glumes one-third shorter, oblong, obtuse, obscurely five-nerved; palet wanting; stamens three.

Found by Mr. T. J. Howell on the sandy seashore in Oregon. It differs much from the ordinary form of *A. exarata*, and perhaps should be considered a distinct species.

AGROSTIS FOLIOSA, V.—Culms 1½ feet high, erect, smooth; culm leaves four or five, erect, somewhat rigid, 4 to 6 inches long, 1½ to 2 lines wide, long pointed; ligule about 2 lines long, lacerate at apex; panicle 4 to 5 inches long, open and loose, the lower branches mostly in fives, unequal, the lower 1 inch long or more, somewhat spreading, capillary, rather few flowered, mostly naked below; spikelets little more than 1 line long, lanceolate, abruptly acute; flowering glume nearly as long as the outer ones, five-nerved, obtuse and shortly four or five-toothed at apex; palet wanting. Collected in Oregon by T. J. Howell. The panicle much like a short branched *A. alba*.

AGROSTIS DIEGOENSIS, V.—Culms erect, stout, 2 to 3 feet or more high, smooth; leaves 4 to 7 inches long, 1 to 2 lines wide, erect, those of the culm with long sheaths (the upper ones 8 or 9 inches long); ligule about 2 lines long, acute; panicle 6 to 8 inches long, lanceolate, the joints rather distant (the lower 1½ to 2 inches); branches numerous, unequal, erect, the longer ones about two inches long, and floriferous above the middle, the shorter floriferous to the base, the flowers numerous; spikelets light green, 1½ to 2 lines long, outer glumes acute, scabrous on the keel; flowering glume one-third shorter, oblong, obtuse, the mid-nerve terminating about the middle, with or without a minute awn; palet none. Collected at San Diego, California, by C. R. Orcutt. The panicle resembles that of *A. alba*, but is narrower, stouter and more closely flowered.

AGROSTIS OREGONENSIS, V.—Root fibrous (annual?); culms about 2 feet high, somewhat slender, radical leaves filiform; culm leaves distant, narrow, soon tapering to a long, slender point, 3 to 4 inches long; ligule short; panicle 4 to 5 inches long, nodding and flexuous, open but not spreading; branches capillary, unequal, mostly in fives below, above in twos or threes, the longer about 2 inches long, all naked below, and rather numerously flowered above; pedicels slender, as long as, to two or three times as long as, the spikelets, which are about 1½ lines long, narrowly lanceolate, and gradually tapering to the acute point, slightly scabrous on the keel, rather thin and purple; flowering glume a little shorter than the empty ones, narrowly lanceolate, five-nerved, apex rather obtuse; palet wanting. The panicle has a rich purple color, and it approaches the *A. scabra*, but is shorter, and with much shorter and erect branches, and a firmer culm. Collected in Oregon by Mr. Howell.

DEYEUXIA CUSICKII, V.—Culms from a strong creeping rhizome, stout, smooth, 4 feet high, radical leaves abundant, a foot long and 2 lines wide, tapering to a long point; culm leaves three or four, distant, long and wide like the radical ones; sheaths shorter than the internodes, smooth, striate, 4 to 8 inches long; ligule decurrent, thin, about 2 lines long, lanceolate at the apex; panicle 6 to 7 inches long, 1 inch or more wide, erect, the lower joints 1 inch apart; branches numerous, verticillate, mostly flowering to the base, the longer ones 1½ inches long, and naked below; empty glumes lanceolate, smooth, rather thin, about 2 lines long, strongly acute or acuminate, the lower one-nerved, upper three-nerved, and a little shorter; flowering glume nearly equaling the empty ones, narrowly lanceolate acuminate, smooth, thinnish, five-nerved, bifid at the apex, awn erect, inserted a little below the middle, slightly longer than its glume, hairs scanty, about half as long as the glume; palet nearly equaling its glume, thin, membranous.

A showy grass, with abundant foliage and rather ample panicle, collected in eastern Oregon at an altitude of 5,000 feet, by Mr. W. C. Cusick, who states that the radical shoots are abundant, but rarely sending up flowering culms.

Turner's New Desmids of the United States.

BY FRANCIS WOLLE.

It is with a feeling of much satisfaction that I have been observing the growing interest in the study of the Desmids, not only of foreign countries, but especially of the United States, and the ready aid furnished to complete the list of our genera and species.

Among the most recent papers is a pamphlet of twenty pages and four plates, extracted from the Journal of the Linnean Society, (London, January, 1886,) by W. Joshua, F.L.S., containing a list of Burmese *Desmidieæ*, and descriptions of new species occurring in the neighborhood of Rangoon, the whole making a large and valuable accession to the knowledge of this family of Fresh-water Algæ.

Messrs. Roy and Bisset, of Aberdeen, Scotland, have made a useful print of a number of new forms mostly from Great Britain which came under their observation.

Thanks also are due to Prof. J. Schaarschmidt, of Hungary for calling attention, in this BULLETIN, to three species of American Desmids, noted in a work of P. Reinsch, 1875, omitted from my DESMIDS OF THE UNITED STATES. The three forms are *Xanthidium Nordstedtianum*, Reinsch, a *Cosmarium* without a name, and *Staurastrum pseudo-Cosmarium.* The first appears to be the same as *Xanthidium fasciculatum*, described and figured by Delponte in his DESMIDIACEARUM SUBALPINARUM, 1873. Differing considerably from the usually accepted form, I described it in this journal, January, 1885, as *X. fasciculatum*, var. *subalpinum.* Delponte's description was given two years earlier than that of Reinsch, and hence has the claim of priority. The second, *Cosmarium*, Dr. Schaarschmidt named *C. Reinschii.* The third is a form I have not recognized; it must be added to our list of Desmids.

Mr. Alfred W. Bennett, F.R.M.S., Lecturer on Botany at St. Thomas' Hospital, has published a paper of much interest in the February number of the Journal of the Royal Mic. Soc., "On the Fresh-water Algæ of the English Lake District, with descriptions of twelve new species," illustrated with two plates.

Mr. W. Barwell Turner, F.R.M.S., read a paper, November 11, 1885, before the Royal Microscopical Society, London, (see Journ. R. M. Soc., December, 1885 and Bull. Torr. Bot. Club, December, 1885), on what he believes are some new and rare Desmids of the United States, but which were mainly derived by him from sources that had been already examined and reported upon by myself. His descriptions of American specimens, with few exceptions, embrace nothing that is either new or rare; he has been surprised into applying these adjectives to the immature or arrested growths and partial developments of plants previously described and classified. A few illustrations:—

The plant he designates as *Leptozosma catenula*, and for which he makes a new genus, is the undeveloped form of an old, well known species, *Desmidium quadratum*, which did not escape my attention when examining the material collected at Malaga, N. J. At first sight it struck me as a novelty, and not until many specimens were observed did the facts become evident. The process of development of the *Desmidieæ* is similar to that of the *Bambusinæ*, which is concisely represented in my Desmids U.S. (Compare p. 24, Plate I, Figs. 15-25.) The filaments are, primarily, entirely distinct in appearance from the mature plants. Unless traced through the various stages of growth they cannot be recognized. The same difficulty occurs with immature specimens of *Desmidium cylindricum;* they are entirely unlike the mature plants.

The form of *Desmidium quadratum* from the pond at Malaga, differs somewhat from the one illustrated, (l. c. Plate XLIX.) The cells are more quadrangular, angles sharper, not so rounded, and ends more suddenly attenuated by incurved lines; suture thick. These, like all other Desmids, are liable to many minor modifications, without destroying the specific character.

Cosmarium rostratum, n. sp., is the same as *C. aculeatum*, (l. c. Plate XVI., Fig. 15.) My description reads, "primarily more or less densely aculeated; later the aculei drop off" (p. 66.) When the description was written I had seen comparatively few specimens. The more usual appearance is with three or four small spines on or near the end of the cell, but indications of the existence of more can almost always be seen. My illustration represents, perhaps, an exception, rather than the ordinary form, hence I can readily see how Mr. Turner was misguided.

Euastrum Floridanum, n. sp., is not new; it is *E. ventricosum*, Lundell. After careful examination of many specimens, I have satisfied myself that it cannot be separated from Lundell's form (*vide* Des. U. S. p. 160). Single specimens may indicate some slight variations, but these, among the many, cannot be taken for a new species.

Docidium occidentale, n. sp. Mr. Turner acknowledges to have seen but one-half of a cell of this Desmid. A new species on so slender a basis cannot be relied upon. Had he seen a fractional part of the hundreds which came under my observation, he would not have ventured a new name for *D. gracile*, Bail.

Staurastrum gladiosum, n. sp.—I fail to see how this form can be separated from *S. echinatum*, which is by no means a rare species, but varies considerably.

Euastrum pseudo-elegans, n. sp.—*E. elegans* is one of our most common forms of the genus; varieties are without number.

Euastrum coronatum, n. sp., appears to be simply a large form of *E. simplex*.

Cosmarium gemmatum, n. sp.—This is nothing more than a poor, imperfectly developed form of *C. triplicatum*, common in ponds near Minneapolis, Minn.; seldom as finely formed as in localities nearer the Atlantic.

Micrasterias mamillata, n. sp., was found in the same small cove in which *M. apiculata* abounds, and appears to be a form of that species.

The following: *Genicularia Americana*, n. sp.; *Penium spirostriolatum*, Barker; *Gonatozygon sexspiniferum*, n. sp., are forms I do not know, and for the present accept as new to our flora.

Of the value of the many varieties recorded I will say nothing, but merely make these general remarks. In the study of the Desmids, as in the study of other plants, the fact must not be overlooked, that none are subject to the mathematical rules of preciseness which govern the astronomer or the engineer in his calculations. Large allowances must be made for variations in the size and form. Two leaves from the same tree, or two roses from the same bush, will scarcely be found absolutely alike. Plants derived from seed out of the same pod may vary greatly, yet they will retain their specific characteristics.

For an idea of the variations among Desmids, reference may be made to Plate XXX., (Des. U. S.), eight quarter-cells of *M. Torreyi*; Plate XXXI., *M. radiosa*; Plate XXXVIII., *M. truncata*.

Patient study and unwearied examinations can alone decide a new species, therefore these suggestions to all who take up the study of the Desmids. Do not be disturbed at the seeming incorrectness of the author; neither be too highly elated at the prospect of something new. If on the first examination of a plant it does not agree in every particular with the diagnosis, or with the illustrations, find another and another; soon the apparent differences may entirely disappear.

Notes on the Flora of the Hudson Highlands.

Seeing by a recent note in the BULLETIN that plants found in the Hudson Highlands are of interest, I send herewith a list, partly the result of my own gathering, partly made up from my father's notes, made in the vicinity of West Point.

Clematis verticillaris, D. C., among the rocks between Fort Putnam and peat bog, April 29, 1845, J. W. B.; *Ranunculus sceleratus*, L., J. W. B.; *R. fascicularis*, Muhl., spur of Crow's Nest, April, 1831, J. W. B.; *Thalictrum dioicum*, L., April 3, 1831, J. W. B.; *Caulophyllum thalictroides*, Michx., ravine on Crow's Nest, J. W. B.; *Adlumia cirrhosa*, Raf., Crow's Nest, J. W. B.; *Arabis lyrata*, L., all about Fort Putnam, 1879; *Polanisia graveolens*, Raf., Washington's Valley, July 27, 1831, J. W. B.; *Hibiscus Moscheutos*, L., near river, J. W. B.; *Tephrosia Virginiana*, Pers., J. W. B.; *Vicia tetrasperma*, Loisel., thicket on the north of Gee's Point, 1830, J. W. B.; *Acer Pennsylvanicum*, L., common at West Point; *Viburnum lantanoides*, Michx., top of Crow's Nest, 1879; *Triosteum perfoliatum*, L., August 22, 1831, J. W. B.; *Eupatorium sessilifolium*, L., August 23, 1835, J. W. B.; *Solidago latifolia*, L., ravine on Crow's Nest, and at Kosciusko's garden, 1830; *Xanthium strumarium*, L., swamp below Kosciusko's garden, 1828, J. W. B.; *Bidens bipinnata*, L., Chain Battery, 1879; *Cichorium Intybus*, L., on road to south wharf, 1879; *Lobelia Dortmanna*, L., Kronket's Pickerel Pond, September 10, 1831, J. W. B.; *Campanula rotundifolia*, L., top of Crow's Nest, 1879; *Epigæa repens*, L.; *Anagallis arvensis*, L., Washington's Valley, September 3, 1831, J. W. B.; *Asclepias quadrifolia*, L., and *A. verticillata*, L., J. W. B.; *Echium vulgare*, L., Gee's Point, J. W. B.; it also grows on the road to the new railway station; *Scrophularia* *nodosa*, L., Washington's Valley; *Collinsonia Canadensis*, L., near Fort Putnam and on Crow's Nest, J. W. B.; *Asarum Canadense*, L., ravine on Crow's Nest, 1879; *Aristolochia serpentaria*, L., near Fort Putnam, 1835, J. W. B.; *Acnida cannabina*, L., Duck Island, J. W. B.; *Polygonum tenue*, Michx., September, 1830, J. W. B.; and *P. Virginianum*, L., Crow's Nest, J. W. B.; *Alisma Plantago*, L., var. *Americanum*, Gray, foot of Crow's Nest, J. W. B.; *Orchis spectabilis*, L., ravine on Crow's Nest, 1879; *Rhyncospora glomerata*, Vahl., Kronket's Pond, very abundant, August 25, 1837, J. W. B.; *Lolium perenne*, L., J. W. B.; *Woodsia Ilvensis*, R. Br., common at West Point; *Camptosorus rhizophyllus*, Link., on Redoubt Hill, Mr. Denton.

W. W. BAILEY.

A Word Concerning Myosurus.

Our thanks are due to Dr. Gray for his criticism and correction, in the January number of this journal, as regards the earliest name, *Myosurus apetalus*, Gay, for the plant which we all had so long been taught to call *M. aristatus*. That the form which he designates as var. *lepturus*, belongs under this species, rather than under *M. minimus*, where we had placed it, we cannot easily be persuaded, who are familiar with all these plants as they grow in the fields, and are moreover supplied with abundant Pacific coast specimens gathered in all stages of maturity; advantages which our learned Cambridge friend admits he has not enjoyed.

With reference to the Drummondian specimens of *M. Shortii*, so long ago distributed by Sir William Hooker, it was not presumed that no true *Myosurus* would be found among them. We only spoke for that representation of the distribution which the herbarium of the California Academy has been favored with. The specimens are two only, and neither of them in flower. The leaves in both display the scattered but prominent spreading teeth of a small plantain; and the reddish, villous pubescence about the bases of the leaves and scapes are the second mark, equally unmistakeable with that aforenamed, of the genus *Plantago*, as compared with *Myosurus*. The species, however, must be *P. heterophylla*, rather than *P. pusilla*, which latter has its leaves entire.

EDWARD LEE GREENE.

Osmunda cinnamomea, L., var. frondosa.

Plate LV.

In 1876 Miss E. G. Knight and myself found at Pelham Manor, Westchester County, N. Y., a single plant of *O. cinnamomea* with fronds of the so-called variety, *frondosa*. I had looked from year to year in the same neighborhood for other specimens, but failed to find any until last June, (1885). I then found a group of scattered root-stocks,—I think some five or six in all, bearing modified fronds of the ordinary type, that is with the lower pinnæ sterile and the upper fertile. Amongst these was one which has some of the middle pinnæ fertile, and those above and below sterile, exactly as in *O. Claytoniana*, L. In fact, had I found it alone, I should have taken it to be that species. It has however, as the accompanying sketch shows, the apices of the pinnæ acuminate. In Eaton's "Ferns of North America," I find mentioned two forms of the variety—with the upper or the lower pinnæ respectively, fertile,—but nothing is said of the form before us. I therefore think it worthy of especial record, and would ask: Does this indicate conclusively that *O. cinnamomea* and *O. Claytoniana* are varieties of one species? Or, as these two species were both growing in this instance, as they often do, near together, could these sports be by any possibility the result of hybridization?

I took specimens of the two sports from the same root-stock.

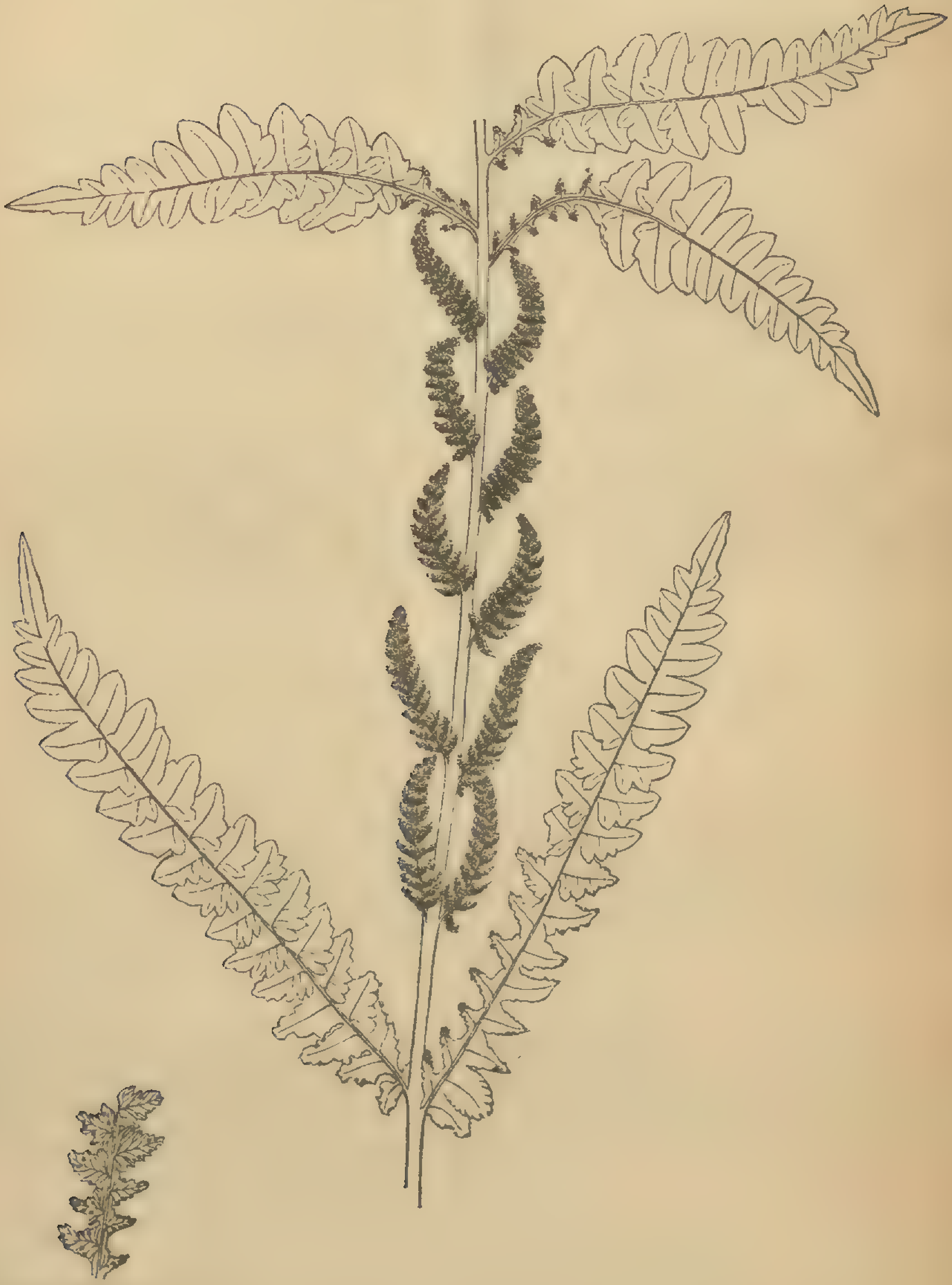
EDWARD H. DAY.

Proterandry in Veltheimia.

A plant of *Veltheimia viridifolia*, growing in my house, is now in full flower and exhibits proterandry. After the blossoms have been open several days, the style, which till then had been shorter than the stamen, elongates and protrudes from the mouth of the perianth. At first I thought this a plain arrangement for cross-fertilization, but now I am not so sure of it. My wife points out to me that the pollen is shed indeed before the stigma can receive it, but by a shrivelling or contraction of the perianth, is held in a mass, and may be caught by the pistil in its passage or precipitated upon it by gravity. The inflorescense is racemose or ascending.

W. W. BAILEY.

Bulletin of the Torrey Botanical Club. Plate LV.



Arthur Hollick, del. ad. nat.

Variation of Osmunda cinnamomea, L. E. H. Day.

Index to Recent American Botanical Literature.

Arizona Fossil Wood.—Identification of the. P. H. Dudley. (Journ. N. Y. Micros. Soc., i., p. 220.)

This silicified wood is of many species, a few of which prove to be *Araucariæ.*

Aspidium Oreopteris, Swartz. T. J. W. Burgess. (Botan. Gazette, xi., p. 63.

This rare fern, hitherto only known as American from specimens collected in Unalaska by L. M. Turner, has recently been discovered by Professor Macoun on Mount Dawson, British Columbia, at an altitude of about 6,500 feet. The fronds are described as narrower and more graceful than those of the Unalaskan and of most European forms.

Botanizing in Texas. J. Reverchon. (Botan. Gazette, xi., pp. 56–59.)

Elastic Fruit in Mammillaria. Thomas Meehan. (Proc. Phil. Acad. Sci., 1885, p. 378.)

Development of the Root in Botrychium ternatum. Douglas H. Campbell. (Botan. Gazette, xi., pp. 49-53, plate IV.)

The roots of the *Ophioglossaceæ* are much less numerous than those of the true ferns, but of correspondingly greater size; a single principal one only is developed at the base of each leaf. They are thick and fleshy, and almost destitute of fibrils. The root-caps do not present the stratified arrangement of cells seen in *Filices,* but walls are soon formed in all directions. The paper is well illustrated and thoroughly discusses the anatomy of the roots.

Fruit of Opuntia. Thomas Meehan. (Proc. Acad. Nat. Sci. Phil., 1885, pp. 365, 366.)

A series of specimens were exibited showing a gradual change from the joint or frond to the fruit of an unknown species, allied to *O. Braziliensis.*

Fungi inducing decay in Timber. P. H. Dudley. (Trans. N. Y. Acad. Sci., v., pp. 110-118.)

Seventeen species are enumerated and many others are yet to be determined. Among the most destructive is *Lentinus* *lepideus*, Fr., which Mr. Dudley has found attacking *Pinus palustris*, Mill., and *P. mitis*, when these are used for ties, bridge timber and cars. *Polyporus versicolor*, Fr., also is very common on white and red oak and chestnut, attacking the sap-wood. *P. applanatus*, Fr., has only been identified on the heart-wood of white oak, though common on the sap-wood of many other trees.

Inflorescence of the Compositæ. Thomas Meehan. (Proc. Phil. Acad. Sci., 1885, p. 376.)

John Williamson. R. M. Kelly. (Southern Bivouac, i., pp. 626-638.)

A most interesting account of his life by one who evidently knew him well and loved him, illustrated by photographic reproductions of Williamson's original plates of Kentucky ferns.

Kansas Mosses.—Third Contribution to the Knowledge of. Eugene A. Rau. (Bull. Washburn College Lab. Nat. History, i., p. 114.)

Eight species, additional to those already determined and catalogued in preceding numbers of the same periodical are enumerated, and new localities given for several species already reported.

Lenticular Markings of various Coniferæ compared. J. L. Zabriskie. (Journ. N. Y. Micros. Soc., i., pp. 218-220.)

Mr. Zabriskie finds the largest lenticular cell-markings in wood of the Sugar Pine (*Pinus Lambertiana*, Dougl.), where they are about one one-thousandth of an inch in diameter. Among the next largest are those of *Pinus palustris*, Mill., *Sequoia sempervirens*, Endl., *S. gigantea*, Dec., and *Pinus ponderosa*, Dougl., while the smallest noted are from the western Arbor Vitæ (*Thuja gigantea*, Nutt.) these being but one two-thousandth of an inch across. He remarks that the number of markings in a certain length of cell bears an inverse ratio to their size.

Mildews of Indiana. J. N. Rose. (Botan. Gazette, xi., pp. 60-63.)

Twelve species, with their host plants, are enumerated, and critical and descriptive notes given; they were all collected in the vicinity of Wabash College.

Occurrence of Red Snow. Charles Hallock. (Amer. Month. Micros. Journ., vii., pp. 42, 43.)

Origin of Leaf-forms.—Notes and Criticisms on Grant Allen's Theory of the. N. L. Britton. (Trans. N. Y. Acad. Sci., iii., pp. 38-44.)

Phyllostictas of North America. George Martin. (Journ. Mycol., ii., pp. 25, 26; concluded.)

It appears, from Mr. Martin's enumeration, that we have 70 species of the genus.

Pithophora Kewensis. W. G. DeWitt. (Journ. N. Y. Micros. Soc., i., p. 218.)

This Alga, originally discovered in the Water Lily tank at Kew Gardens, was supposed by Wittrock to have been an importation from Brazil, but Mr. A. D. Balen has found it in several places near Plainfield, New Jersey, so its distribution is not alone tropical. Mr. DeWitt states that it grows well in his aquarium, where it has fruited during the past two months.

Quercus prinoides, Willd. Thomas Meehan. (Proc. Acad. Nat. Sci. Phil., 1885, p. 365.)

Mr. Meehan exhibited a series of fruiting branches of this oak, showing remarkable variation in leaf-forms, which in some were orbicular, in others lanceolate; some had lobed and wavy margins, while others were quite entire. The plants all grew within a few feet of each other.

Recent Notes and Descriptions of Eriogoneæ. C. C. Parry. (Botan. Gazette, xi., pp. 54-56.)

Dr. Parry criticizes the results reached by Mrs. M. K. Curran published in the Bulletin of the California Academy.

Sketch of Louis D. De Schweinitz (with portrait.) W. A. Kellerman. (Journ. Mycol., ii., pp. 31-34.)

Staining and Double Staining Vegetable Tissues. (Amer. Month. Micros. Journ., vii., pp. 43-48.)

The Editor republishes the methods of Dr. George S. Beatty, which were originally contributed to the "Popular Science Monthly," and says that in his opinion they are as good as any since devised.

Studies in the Botany of California and Parts Adjacent.—IV. Edward Lee Greene. (Bull. Calif. Acad. Sci., ii., pp. 41-60; advance sheets.)

Under the caption "On some Cichoriaceous Compositæ," the author reviews the arrangement of the genus *Microseris* in Dr. Gray's Synoptical Flora N. A., and contends that its species are superlatively amplified. He proposes the restoration of the genus *Calais*, DC., to include five species of the above; *Scorzonella*, Nutt., to include eleven others; *Ptilocalais*, Gray, with three species, and *Nothocalais*, Greene, nov. gen., for those included in section *Nothocalais* of the genus *Microseris* by Dr. Gray; *Troximon cuspidatum*, Pursh., becomes *N. cuspidata*, Greene. Seven new species of these *Compositæ* are characterized. Mr. Greene also publishes descriptions of four new *Euphorbias*, two species of *Ranunculus* (*R. Bolanderi* and *R. Ludovicianus*); *Meconella denticulata*, *Argemone corymbosa* and *Draba Sonoræ.*

Tendril Movements in Cucurbita maxima and C. Pepo. D. P. Penhallow. (Amer. Journ. Sci., xxxi., pp. 100-114 and 178-189; concluded.)

The account of observations on the growth and circumnutations of the tendrils of these plants is continued, and the conclusions reached are presented. Mr. Penhallow finds that growth is promoted by an increase of temperature and humidity, and retarded by an increase of temperature when other conditions are not favorable, and also by excessive transpiration. Movements of tendrils and terminal buds, being phenomena of growth, are modified by whatever conditions affect growth. With regard to the circumnutations of the tendrils he concludes that they are owing to unequal growth by producing unequal tension of tissues, chiefly in the vibrogen tissue, which may therefore be regarded as the seat of movement. The transmission of impulses is effected through the continuity of protoplasm in the active tissues.

Virulence of the Common Parsnip. Thomas Meehan. (Proc. Phil. Acad. Sci., 1885, p. 383.)

Mr. Meehan referred to the death of several children at Danville, Penn., in the spring of 1884, caused by eating the roots of the wild parsnip. Some of these roots had been sent him by the attending physician, and one of them bore marks of the children's teeth. They were planted, and grew into the true garden parsnip, *Pastinaca sativa*, which has so commonly escaped from gardens. There seemed no chance for error in this case. It was subsequently ascertained that in the cultivated form some growers are careful about working among the leaves while the dew is on them, as severe cases of poisoning have resulted from this, and on large seed farms the workmen have to protect their hands and arms against contact with the juices, or risk poisoning similar to that from *Rhus toxicodendron.*

White seeded Variety of the Honey Locust. Thomas Meehan. (Proc. Phil. Acad. Sci., 1885, pp. 404, 405.)

The seeds of this tree, which grew near Germantown, Penn., were white instead of dark olive-brown as in the normal condition. It was of considerable age, and had evidently borne fruit for many years. The seeds were nearly orbicular in shape, instead of the usual narrowly-ovate form.

Botanical Notes.

Hard Rubber Slides.—For about six years I have been using a kind of rubber slide which I have found very convenient for various reasons, so that I think a description of it might be of some interest to microscopists. The slide is of ordinary length and width (3x1 in.), but quite thin (about 1-7 mm.), and is provided in the middle with a circular perforation about 15 mm. in diameter. I place the slide on the turntable, apply some cement to the edge of the perforation, and then fasten a 20 mm. cover glass (circle) on the rubber slide, which then can be used like an ordinary glass slide. Very thin sections or objects not requiring any cell may be mounted on the upper side of the circle (i.e., the side not touching the rubber), while, in order to mount thicker objects, or such as are to be protected from pressure, I simply invert the slide and have a cell the depth of which I can easily increase by a ring of cement in the usual way.

I hardly need to say that the principal advantage gained with this slide is that the observer is enabled to examine both sides of any object under the highest powers. Perforated slides have long been in use, but I am not aware that they were made of rubber,

the material best adapted for this purpose, and, at the same time, inexpensive.
JOS. SCHRENK.

A New Botanical Association.—On the evening of March 5th the "Asa Gray Botanical Club" was organized in Utica, N. Y., with a membership of twenty-four. The officers elected were: President, Dr. Jos. V. Haberer; Vice-President, Miss Phelps; Secretary, Prof. Geo. C. Hodges; Treasurer, Rev. W. B. Coleman; Curator, Mr. W. P. Shephard. Meetings are to be held every Saturday.

Annals of the Royal Imperial Natural History Museum of Vienna.—We have received the first number of this periodical, containing an account of the collections which are now provisionally arranged in the new museum building. In a following number we are promised an account by Dr. G. Beck, of the Flora of Southern Bosnia and adjacent parts of Herzegovina. The "Annals" are edited by Dr. Franz Ritter von Hauer.

Proposed Monograph of the Desmidieæ.—Mr. W. Barwell Turner has issued a prospectus of a monograph of all known Desmids, to be published quarterly in about twelve parts, each to contain from fifteen to twenty plates. The work will be commenced about October 1st, 1886, provided a sufficient number of subscriptions are received.

The Evolution of Phanerogams.—The second volume of MM. Marion and Saporta's work, "L'Evolution du Règne Végétal," is devoted to the Phanerogamia. These they consider to have sprung directly from the heterosporous Vascular Cryptogams. They trace three distinct stages in this transformation, viz.: Progymnosperms, Gymnosperms and Metagymnosperms, and refer the *Lepidodendrons*, *Sigillarias* and *Calamodendrons* of the carboniferous flora to the first of these groups. (See Nature, xxxii, p. 289, and Journ. Roy. Mic. Soc., vi, p. 99.)

Death of Professor Edouard Morren.—Announcement is made of the death of Charles-Jacques-Edouard Morren, at Liége, on the 23d of February, 1886. But a short time previously we had received his very interesting essay, "La Sensibilité et la Motilité des Vegetaux." Bruxelles, Décembre, 1885. He was perhaps best known as editor of "La Belgique Horticole."

Note on Tiarella cordifolia.

Tiarella cordifolia has more than once been sent to us with somewhat attenuated and dentate or even laciniate petals, leading one to suspect a possible crossing with *Mitella diphylla*. This is to ask those who meet with this anomaly to notice, where they meet with it, whether it occurs in more than single plants, and whether accompanied by the two plants.

ASA GRAY.

[This was received too late for insertion.—EDS.]

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XIII.] New York, May, 1886. [No. 5.

Botanical Notes in the Great Valley of Virginia and in the Southern Alleghanies.

By E. G. Britton.

(Read March 9.)

These regions have been quite thoroughly explored by botanists, and I can hope to add little that is new to the published accounts* of their flora, but as a record of an autumn trip into a most delightful country this may not prove uninteresting.

The great Appalachian Valley extends almost uninterruptedly from Lake Champlain southwestwardly to its termination at Lookout Mountain in Georgia. It is excavated from Lower Silurian rocks, mainly limestones and slates. Having travelled southward from Harrisburgh, Penn., to Luray in central Virginia, it was here in Page Valley, as the Appalachian depression is there locally known, that our botanizing began. The underlying rock is mostly limestone, bounded, however, to the east by quartzite, and from these different rocks result two soils differing radically in their flora. On the silicious soils were noticed many plants which grow abundantly on the sands of southern New Jersey; among these were: *Stylosanthes elatior*, Swartz; *Euphorbia corollata*, L.; *Ascyrum Crux-Andreæ*, L.; *Cuphea viscosissima*, Jacq.; *Tephrosia Virginiana*, Pers.; *Chrysopsis Mariana*, Nutt.; *Gnaphalium purpureum*, L., *Quercus nigra*, L., and *Q. stellata*, Willd., the latter larger than we had seen before. On limestone knobs *Cercis Canadensis*, L., grew abundantly, and on the bank of the Hawksbill Creek we found *Sedum telephiodes*, Michx. Its petals were white, but the general effect of the plant was pink, owing to the redness of the pedicels and stamens. The leaves and stems were covered with a beautiful glaucous bloom. In order to preserve these lovely specimens they were ironed until flat and thin between sheets of newspaper, and then allowed to dry in an oven. Herbarium specimens were thus obtained which have not since lost their leaves.

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* See Dr. Gray's account in a letter addressed to Dr. Hooker, published in the Am. Journ. Sci. (I), xlii., pp. 1–49; and Mr. Redfield's paper in the BULLETIN, vi., pp. 331–339.

The banks of the Hawksbill were blue with *Eupatorium cœlestinum*, L. Among introduced plants along the roadsides grew *Xanthium spinosum*, L., and *Filago Germanica*, L.; and everywhere growing as weeds, were seen *Solanum Carolinense*, L., with white and blue flowers, and *Sida spinosa*, L. The most abundant Conifer was *Pinus mitis*, Michx., on whose leaves the stomata were conspicuous with a pocket lens, arranged in longitudinal rows on both sides. *Pinus inops*, Aiton, is very abundant elsewhere in the valley, but was not noted at Luray. The only form of vegetation seen in the famous caverns was the mycelium of a fungus growing on wet planks.

The list of plants noted at the Natural Bridge of Virginia is much too long for insertion here, but the following warrant mention: In the deep ravine of Cedar Creek, which is spanned by the Bridge, grew *Heuchera villosa*, Michx.; *Draba ramosissima*, Desv.; *Samolus Valerandi*, L., var. *Americanus*, Gray; *Sedum ternatum*, Michx.; *Rhus aromatica*, Ait.; *Jeffersonia diphylla*, Pers.; *Hydrophyllum Canadense*, L., and *H. Virginicum*, L.; *Asarum Virginicum*, L.; *Aralia quinquefolia*, Gray; *Hydrangea arborescens*, L.; *Ruellia strepens*, L; *Elephantopus Carolinianus*, Willd.; *Asimina triloba*, Dunal; *Pellæa atropurpurea*, Link; *Asplenium Ruta-muraria*, L.; *Cystopteris bulbifera*, Bern.; and *Camptosorus rhizophyllos*, Link. On the hillsides were found *Houstonia purpurea*, L., var. *longifolia*, Gray; *Calamintha Nepeta*, Link; *Asclepias verticillata*, L.; *Polygala ambigua*, Nutt.; *Linum sulcatum*, Riddell, with showy yellow flowers—which dropped off when touched—and *Salvia lyrata*, L. The large trees of Arbor Vitae along the walk leading under the Bridge were remarkably fine; one of them measured fourteen and one-half feet in circumference.

At Balcony Falls, where the James river cuts through the Blue Ridge, we collected *Campanula divaricata*, Michx.; *Dicentra eximia*, DC., in full bloom on September 5. *Coreopsis senifolia*, Michx., and *C. verticillata*, L., were showy along the railroad track. *Paronychia argyrocoma*, Nutt., and *Hypericum prolificum*, L., grew on the rocks above.

Near Roanoke, Va., were found *Cyperus Lancastriensis*, Porter, and *Ipomœa lacunosa*, L., growing as weeds in a cornfield.

Unless I could show you some of the large photographs taken for the Philadelphia owners of the Eastern Tennessee and Western North Carolina Railroad, you could not begin to realize what a lovely ravine it is through which the Doe River makes its way out from among the mountains to join the Holston. Unfortunately the focusing plate of our camera was found to be broken after the train had left us in the wildest and prettiest part of the gorge, on a stone embankment that sloped 50 or 60 feet down to the rocky stream below. Above us towered the lofty walls of Pardee's Point, on whose steep escarpments scarcely a tree could cling. Here, if anywhere, in this shady, narrow ravine, must the ferns and mosses grow. But, as usual, it was the other side that looked most promising; there, was the natural bank of the river wooded to its edge, here, were the piles of debris thrown down in the construction of the roadbed from the rocky slope, with logs and stumps of trees, and the usual weedy looking, rank growth of saplings and other plants which follow man's devastating efforts at penetrating nature's wilds. To be sure, she had covered up many of the logs and stumps with the tender, pink-flowered vines of *Adlumia cirrhosa*, Raf., and nestled in their shade beautiful clumps of *Dicentra eximia*, DC.; both of these were still in bloom on September 12, and on the shelf-like ledges above us were still seen *Campanula divaricata*, Michx., and *Corydalis glauca*, Pursh, in flower. A few mosses and hepatics were gathered from these dripping shelves, and two little ferns, *Cystopteris fragilis*, Bernh., and *Aspidium marginale*, Swartz. A belated cluster of flowers was picked from a clump of *Hydrangea arborescens*, L., and *Aralia spinosa*, L., was seen in full bloom. It is a handsome bush and forms as pretty clumps as our sumachs. *Carex stenolepis*, Torrey, was found near the edge of the stream.

But this Doe River gorge is only the gateway, for Roan Mountain lies beyond, and we must climb all day in a tossing, bone-aching stage-coach ere we reach "Cloudland." Frequent walks and stops on the way up enabled us to botanize quite satisfactorily, and thus we made several new acquaintances. The first and most charming of these was *Chelone Lyoni*, Pursh, with its lovely pink blossoms; we saw the greatest abundance of *Cimicifuga racemosa*, Ell., and luxuriant plants of *Solidago cæsia*, L., followed higher up by an abundant growth of *Eupatorium ageratoides*, L. Both of these were in full bloom, and stretched away under the trees a graceful white carpeting to the giants that towered above them. Never had I seen such forests, even on the slopes of the Green and White Mountains; Chestnuts, Oaks, Beeches, Birches, Maples and Tulip Trees, attaining such size that it was not uncommon to find logs whose diameter was nearly five feet. *Magnolia Fraseri*, Walt., grew abundantly with these, and toward the summit *Ilex monticola*, Gray, was frequently seen 15 to 20 feet high, and *Cratægus tomentosa*, L., var. *punctata*, Gray. Just before reaching the zone of *Abies Fraseri*, Pursh, which here replaces *Abies balsamea*, Marsh., and *A. nigra*, Poir., of our northern mountains, we found the ground carpeted with *Houstonia serpyllifolia*, Michx.; and here also grew showy plants of *Gentiana quinqueflora*, Lam. belieing its name, for I counted over one hundred flowers on a single plant. *Rudbeckia laciniata*, L., and *R. triloba*, var. *rupestris*, Gray, were showy and abundant. Among the firs we found *Saxifraga leucanthemifolia* and *Heuchera villosa*, Michx., very abundant in damp, rocky places, and contrasting their delicate white flowers with the dark trees around them.

Three delightful days were spent on the summit, in a large hotel constructed of balsam cut right there on the mountain, and occupied mainly by hay-fever patients. The top is a great mountain meadow, in parts densely cushioned with beds of the fine soft grass, *Danthonia compressa*, Austin, and much *Carex æstivalis*, Curtis. We walked a great deal, exploring the various outlook points and ledges, collecting the rare *Sedum Rhodiola*, DC., and *Thalictrum clavatum*, DC., from Eagle Cliffs, finding late blossoms of the pretty little bluet *Houstonia serpyllifolia*, Michx., and the dark purple ones of *H. purpurea*, L., hidden in shady nooks; gathering the lovely red berries of *Vaccinium erythrocarpon*, Michx., and the flowers of *Leiophyllum buxifolium*, Ell., var. *prostratum*, Gray, which were surprisingly numerous, considering it was the second bloom. I found a number of blossoms in which all the petals were replaced by stamens; the plants carpeted the ground, covering the stones and spreading everywhere on the summit, with *Menziesia ferruginea*, Smith, var. *globularis*, Gray, and *Potentilla tridentata*, Ait. *Alnus viridis*, DC., and *Rhododendron Catawbiense*, Michx., formed beautiful clumps, like prettily planted groups on a lawn, and grow in immense quantities. In fact I was disappointed because there were so many of these last four plants and so few others. By careful search among the bushes on the south slope of the mountain we found *Trautvetteria palmata*, F. and M., in fruit; fine plants of *Angelica Curtissii*, Buckley, *Viola canina*, L., var. *sylvestris*, Regel, and *V. blanda*, Willd.; *Prenanthes altissima*, L, and *P. serpentaria*, Pursh., var. *barbata*, Gray; *Lobelia syphilitica*, L., and *Chelone glabra*, L.; *Solidago spithamea*, *S. patula*, *S. bicolor*, and quantities of the cut stems and leaves of *Veratrum viride*, Ait., which we learned had been dug by the natives for the medicinal roots, which bring four or five cents a pound. The prettiest of all the mountain flowers at this season was the *Geum radiatum*, Michx., with its golden yellow flowers, growing most abundantly on the northern slope; and here too we found *Geum geniculatum*, Michx.; *Aspidium spinulosum*, Swartz, var. *dilatatum*, Gray; *Lycopodium Selago*, L.; *Maianthemum Canadense*, Desv., and *Circæa alpina*, L. Among the *Danthonia* on the summit we noticed *Juncus articulatus*, L., *Aira flexuosa*, *Agrostis rupestris* quite abundant. We walked down the mountain, preferring this to jolting down in the stage. Just as we started down we noted the Mountain Ash twenty feet high, in beautiful fruit, with *Cornus alternifolia*, L., and an abundance of *Viburnum lantanoides*, its leaves already turned in their peculiar mottled way. Along the path followed by the mail carriers, where the thickets of *Rhododendron maximum*, Michx., had been burned through, we saw *Plantago Rugelii*, *Gnaphalium purpureum*, L.; *Marchantia polymorpha*, L., and the moss *Funaria hygrometrica*, Sibth., which the French call "La Charbonniere." Ferns were numerous and the following were noted: *Dicksonia pilosiuscula*, Willd.; *Adiantum pedatum*, L.; *Asplenium thelypteroides*, Michx.; *Aspidium acrostichoides*, Sw., var. *incisum*, Gray, and *A. spinulosum*, Sw., var. *intermedium*, Gray; *A. Noveboracense*, Sw., and two plants of

A. Goldieanum, Hook.; this extends the southward range of the last named species, as given by Gray, Eaton and Davenport; *Phegopteris hexagonoptera*, Fee, and *Botrychium Virginianum*, Sw. We found *Galium latifolium*, Michx., and *G. lanceolatum*, Torrey; *Galax aphylla*, L.; *Pyrularia oleifera*, Gray; *Oxydendrum arboreum*, DC., and fasciated flowers of *Helenium autumnale*, L.; *Lobelia cardinalis*, L. Two different forms of *Astilbe decandra*, Don., were obtained along the trail; one, the type of the species, with acuminate apices to the leaf-lobes, the other with blunt and crenate margins to the leaves, and shorter, smaller follicles. This latter is a new form to Dr. Gray and Mr. Watson. In rivulets half-way up grew *Saxifraga erosa*, Pursh., and *Diphylleia cymosa*, Michx., the latter very conspicuous because of its scarlet pedicels and blue-black fruit.

To make this eventful week complete we went to the terminus of the railroad at Cranberry, where one of the most valuable iron mines of the country is located. It could hardly have been expected to find such delightful accommodations as we here enjoyed, in a hotel under the charge of Philadelphia people and luxurious in its appointments and neatness, situated in a wild and beautiful valley. A peculiary hoary *Verbena*, fine specimens of *Spiranthes graminea*, Lindl., var. *Walteri*, Gray, and *Solidago patula*, Muhl., were found here.

Returning from Cranberry to the Great Valley again at Johnson City, we went by rail to Morristown, Tenn. From there a delightful ride along the valley of the French Broad, brought us at evening to Asheville, N. C. Along the river banks we saw for the first time since leaving the North the Buttonball, Sweet Gum, Ash-leaved Maple (*Negundo aceroides*), recognized *Halesias* growing quite abundantly, and noticed in the meadows the coarse *Arundinaria monosperma*, Vahl., with glossy cane-stalks. Asheville is a southern Bethlehem; standing on an elevated plain among low hills with the mountains encircling it in the distance, and the Swannanoa and French Broad Rivers at its feet; it affords delightful drives and boasts a breezy, sunny location. Along the Swannanoa grow magnificent oaks, *Q. falcata*, Michx., and *Q. imbricaria*, Michx.; here *Leucothoë Catesbæi*, Gray, grew in profusion, and we admired its glossy foliage and abundant fruit. A single specimen of *Aconitum uncinatum*, L., was found on a high bank, and *Ipomœa coccinea*, L., with *Chrysopsis graminifolia*, Nutt, grew wild in cultivated grounds.

But Asheville is too civilized, and walking was far from agreeable in that dusty, hilly region, so we took the afternoon train on the W. N. C. R. R., reaching Black Mountain Station in the evening. Here, indeed, all else save the hotel is wild and beautiful. In the valley on the eastern side of the railroad there is a mica mine, to which we walked the morning after our arrival, botanizing as we went. The woods were sandy and dry, and autumn was suggested by the tint of the Sorrel Tree and the brown nuts of the Chinquapins. *Gerardias* were in bloom. *G. purpurea*, L., and *G. Skinneriana*, Wood, and *Solidago Boottii*, Hook, were collected. *Helianthus occidentalis*, var. *Dowellianus*, T. and G., and *Coreopsis senifolia*, Michx., added to the list of yellow blossoms. The prostrate plants of *Lespedeza striata*, Hook. and Arn., carpeted the ground along the roadsides; and *Cuscuta compacta*, Juss., climbed up the Blueberry bushes; *Cacalia atriplicifolia*, L., and *Polygala fastigiata*, Nutt., were in bloom in the meadows.

It was as a special treat that we had decided at the last to ascend Mt. Mitchell, for having thoroughly explored the Roan we had little expectation of adding much to our collections, only we should have come away dissatisfied had we failed to climb this, the highest mountain east of the Rockies. Unlike the Roan, however, it has no carriage road up it, so that the ascent has to be made on horseback, and instead of a big hotel full of people, on the summit there is only the rock-encircled grave of Elisha Mitchell. Like the Roan, its base is wooded and heavily timbered with magnificent forest trees and a dense undergrowth of Rhododendron and Laurel along the streams. These were numerous, and we crossed and recrossed them many times in our winding ascent. I longed to visit these wilds in spring to see the flame-colored Azalea in bloom, whose fruit-laden branches hung over our path. Of low plants there were few in bloom in the shady woods. *Diphylleia cymosa*, Michx., grew in hollows of the streams, and *Amianthium muscætoxicum*, Gray, and *Aster Curtisii*, T. & G., along the path. Among the ruins of the half-way house, *Cratægus punctata* was again noted bearing many branching thorns, and *Hypericum prolificum* was gathered in fruit. Here begins the coniferous vegetation of White Spruce and Balsam; the ground and rocks were densely covered with mosses and ferns similar almost in every respect to the same zone in the White Mountains, save for an occasional bush of *Vaccinium erythrocarpon* and *Menziesia*, or a hollow with *Rhododendron Catawbiense.* The fruit of *Lilium Grayi*, Watson, was found at one of the clearings, and *Angelica Curtisii*, Buckl., abundantly with *Monarda didyma*, L. As we drew near the summit the black, angular fruit of *Trillium grandiflorum*, Salisb., became quite frequent, and at the place where we left our horses for the last scramble up to the top, we found a few late showy blossoms of *Hypericum graveolens*, Buckley. *Cuscuta rostrata*, Shuttlew., twined over anything and everything, and its waxy white blossoms were the prettiest flowers gathered that day, and the only offering I had to lay on Mitchell's grave. Around it is a space of forty or more feet, bare but for a low stunted form of *Trifolium repens* with its blossoms close to the ground, and the tiny panicles of *Poa annua* in crevices among the rocks.

An hour's rest, lunch, and a fairly good view, and then began the descent. Walking was more comfortable than riding for the greater part of the distance, as the horses picked their way down the rocks less readily than we, so that it was nine o'clock and quite dark ere we reached Mt. Mitchell Hotel, tired out after so long a day and so hard a ride—twenty-six miles in all. A Sunday morning spent in resting and letter-writing and then we turned our faces homeward. As we wound down the mountains through the wonderfully beautiful Swannanoa Gap, it was with the keenest regret that we bade farewell to these fascinating regions. The railroad is a marvel of engineering skill; in the short space of five miles there are seventeen tunnels, one long one curving around a point, and others following in such rapid succession that three might be seen in line from the rear platform, and at the last, just before we reached Round Knob, the train creaked over three long white trestles, one above the other over the same stream, with a curve between each, and slowed up at the hotel for supper.

Bauhinias living and fossil.

Description of a Species of Bauhinia from the Cretaceous Clays of New Jersey.

By J. S. Newberry.

Bauhinia cretacea, n. sp.

Plate LVI.

Leaves large, from four to seven inches in diameter, general outline circular, deeply two-lobed, sinus reaching below the middle, margin entire, base rounded, lobes oblong or broadly spatulate; nervation strong, radiate or bilateral, midrib slender, from a half-inch to an inch and a half in length, running to bottom of mesial sinus, there forking equally, each slender branch running parallel with the margin of the sinus; lateral nerves strong, usually two, rarely one on each side springing from a common base, the interior lateral nerve strongest, forking several times and giving off fine branches, which inosculate to form a graceful festoon near the upper margin; the exterior lateral nerves, throwing off numerous branches which anastamose in loops near the margin, producing a camptodrome nervation. In those which have but a single lateral nerve, the lobes are narrower, and each is covered with the ramifications of the branches which spring chiefly from the outer side of the single main nerve.

The form and nervation of these leaves are so precisely those of some of the Bauhinias of the present flora, that there can be no reasonable doubt we here have the remains of a well marked species of this genus, which grew near the mouth of the Hudson River, in the middle of the Cretaceous age, and was the associate of the Magnolias, Tulip-trees, Aralias, etc., which composed the angiosperm forest of eastern North America. In size, some of these leaves exceed those of any living Bauhinia, and the outline and nervation indicate, that the genus was as perfectly defined and highly specialized in the Cretaceous age as now.

The living Bauhinias inhabit the tropical and subtropical regious of the Old and New World: India, Mauritius, Surinam, Cuba, Mexico, etc. The genus is closely related to *Cercis*, and most of the species have a similar habit. In a few the leaves are orbicular or slightly emarginate, but they are generally bilobed, the sinus reaching the middle of the leaf, sometimes extending to the base, as is the case with the only species inhabiting the

United States, *B. lunarioides*, Gray, of Texas and Mexico.

In most of the East India species the nervation is more crowded than in the fossil leaves before us, each nerve having three, and sometimes four lateral nerves, the medial nerve however, being quite the same. In several oriental species, and all those of the New World, the nervation is simpler, and essentially like that of the fossil. In the Texan species the leaves are generally divided to the base, and the medial nerve is therefore obsolete; the lateral nervation is, however, precisely that of our fossil. As the depth of the sinus is a variable character, differing greatly in the leaves of the same tree, it is quite possible that our *Bauhinia lunarioides* is only a dwarfed and slightly modified descendant of the Cretaceous species.

EXPLANATION OF PLATE LVI.

Figs. 1 and 2. *Bauhinia tomentosa.* India.
Fig. 3. *B. porrecta.* Cuba.
Fig. 4. *B. parvifolia.* India.
Fig. 5. *B. cretacea.* N.

Dendrological Notes.

By C. S. Sargent.

The late Mr. S. B. Buckley, many years ago published (Am. Journ. Sci., 2d Ser., Vol. xxvii., March, 1859, p. 289) an interesting account of the forests and trees of the Big Smoky Mountain region of North Carolina and Tennessee. I am glad to be able to bear witness to the accuracy of Mr. Buckley's observations recorded in this paper, which has only recently become known to me. Mr. Buckley's interesting discovery of *Quercus Leana* on the banks of the Tennessee River near Franklin, in Macon County, seems to have passed unnoticed from that day to this. His determination of this plant was doubtless correct, however, for last September I found *Q. Leana* on one of the main forks of the Tennessee—the Tuckaseego, at Charleston, in Swaine County—where a single small tree growing with *Q. imbricaria* was seen. *Quercus Leana* is now known from the neighborhood of Washington to Missouri, and has been found in several remote and isolated localities. It is probably of recent hybrid origin.

The loose scales of the cup and the pubescense upon the underside of the leaves seem to point to *Q. tinctoria* rather than to *Q. coccinia*, as suggested by Dr. Engelmann as one of its parents. But whatever may have been its origin, it is an interesting question whether a plant so widely distributed and so constant in its character as *Q. Leana*, has not now a sufficiently permanent hold of its own upon existence to be considered a species, especially as it cannot, even with the broadest extension of any of the recognized species, be referred, as a form, to any of these. The status of *Q. Leana* is identical, although it is more widely distributed, with that of *Q. heterophylla*. Both seem to be of comparatively recent hybrid origin, and both have become so fixed in character, that it is perhaps permissible to consider them as species. Mr. Buckley called attention to the immense size of many individual trees in the Big Smoky Mountains. Here, as he pointed out, is the true home of *Abies Fraseri*, which often attains a height of 100 to 150 feet, with a trunk from 3 to 4 feet in diameter. *Halesia* here becomes a large forest tree, with a clean straight stem, often 60 feet to first branch, and 3 to 4 feet in diameter. Specimens of *Æsculus flava* 4 feet in diameter, are common, and nowhere else can finer Hemlocks, Liriodendrons or Chestnuts be seen. *Ilex monticola* becomes a considerable tree, 30 or 40 feet high, with a trunk 6 to 8 inches in diameter.

Nowhere else, I believe, in North America, can so many arborescent species be found in such a limited area, as in the Big Smoky Mountains. We counted sixty-eight species, or nearly one-sixth of all the arborescent species of North America, north of Mexico, between Charleston, on the Tuckaseego, and the summit of Andrew's Bold, a bald spur of Clingman's Dome, 5,764 feet above the ocean, the whole distance by the trail being but thirteen miles. These bald spots in the Smoky Mountains are very generally covered with thickets of *Vaccinium Erythrocarpon*, often 5 or 6 feet high, and which in September were loaded with fruit often more obovate than round, and when fully ripe, is jet black, shining, very juicy, but rather insipid. The bushes everywhere broken down, indicate that the bears find it palatable.

Mr. Buckley does not mention the discovery of *Magnolia cordata*, and later travellers have not been more fortunate in this respect. Indeed, it is not probable that this tree, as is also true of *Gordonia pubescens*, has been seen at all since its original discovery. The younger Michaux's *Magnolia cordata*, from the banks of the Savannah River, near Augusta, probably belonged to a not uncommon form of *M. acuminata*, with broad, and often cordate leaves, and with light yellow flowers. Here too, I believe, belongs Mr. Mohr's Alabama plant, referred to *M. cordata*, in the Census Report upon the Forests of the United States.

It is not known when the elder Michaux dicovered his *Magnolia cordata*. The early part of his journal is missing, but late in the autumn of 1787 he made a long and arduous journey to the mountains of South Carolina, principally for the purpose of collecting young trees of this species, so that it is fair to suppose that he had discovered it on some previous journey, the record of which, unfortunately, has not been preserved. He ascended the Keowee, to where the head of the river is formed by two rapid mountain streams, now laid down on the map as the Devil's Fork and White Water Creek, and here on steep mountain slopes, overlooking these streams, he found *Magnolia cordata* in abundance. This was in the month of December, and as he seems to have had no difficulty in distinguishing the species without leaves, he must have become familiar with it previously, and probably in this very locality. The cultivated plants by which this species is now only known must be all descended from the seedling trees collected by Michaux in this winter journey, during which he nearly froze to death, and barely escaped starvation.

Magnolia cordata should be looked for then, in the high and very broken country a little to the southeast of Highlands, in Macon County, North Carolina, and between that place and Cousin's Head, in South Carolina. The trail from White Head, near Highlands, to Cæsar's Head, crosses the sources of all the small streams which form the Keowee, and this region is probably most easily entered from this direction. No botanist since Michaux, so far as I have been able to learn, has ever visited it. It is reported to be entirely unsettled, very rough and broken, and covered with magnificent forests of immense trees. It was just on the northern border of this region that *Rhododendron Vaseyii* was discovered a few years ago. It offers an inviting field for botanical exploration. Well developed fruit of *Magnolia cordata* is not known.

Fern Notes, VIII.

BY GEO. E. DAVENPORT.

Aspidium Lonchitis, Swartz.—This fine evergreen fern was found growing on Mt. Peddo (Adams), Washington Territory, in August, 1885, by W. N. Suksdorf, of White Salmon. The plants were growing on shady rocks at an altitude of from 6,000 to 7,000 feet, and show all the typical characteristics of the species. One interesting dwarf specimen has perfectly fruited, excessively spiny fronds only 3 inches high, and from ½ to ¾ of an inch broad.

Aspidium aculeatum, Swartz, var. *scopulinum*, D. C. Eaton, *Botrychium ternatum* Swartz—previously collected in a larger form in Falcon Valley, and on the Columbia; *Botrychium matricariæfolium*, A. Br., *Botrychium simplex*, Hitch., plants very fleshy, and *Lycopodium alpinum*, L., were also collected on Mt. Peddo.

The specimens of *B. ternatum* partake of the California forms of that species, but are much smaller. Those of *B. matricariæfolium* well sustain the character of the species for variation, and their buds conform to the characters previously pointed out. (Torr. Club Bulletin, vol. vi., pp. 194, 196, 198; vol. xii., p. 23.)

Mr. Suksdorf, who is doing excellent service for the flora of his region, has also collected an interesting form of *Polypodium vulgare*, L., with long, narrow fronds, and very bluntly rounded obtuse divisions; an alpine form of *Polypodium falcatum*, Kellog, not readily determined but for the very decided liquorice-tasting root-stock; *Isoetes Nuttallii*, A. Br., *Marsilia vestita*, H. and G., and *Azolla Caroliniana*, Willd.

TEXAN FERNS.—From J. Reverchon, Dallas, Texas, I have received one of the most interesting and valuable collections of ferns made for a long time, the following being of special interest to botanists:

Pellæa aspera, Baker.—Fine specimens sparingly collected on exposed rocks, Upper Hondo, in June, 1885.

Pellæa flexuosa, Link.—Superb specimens, and very distinct from any forms of *P. cordata*, J. Sm.

Pellæa Wrightiana, Hook.—Typical plants, the smaller ones closely resembling *P. ternifolia*, Link.

Notholæna candida, Hook.—A fine series of the typical form of this species, ranging from 2½ to 15 inches in height, with laminæ varying from 1 to 6 inches in length, 1 to 3½ inches in breadth, and with from 2 to 8 pair of pinnæ; throughout all, however, an almost stereotyped form of segment prevails.

Aneimia Mexicana, Klotz.—Specimens large and fine, some of them showing exceedingly interesting forms of abnormal development. In one example, what should have been the sterile lamina has been almost transformed into a fertile panicle, the apices of the divisions alone remaining sterile and green. This specimen has in addition the usual pair of fertile spikes well developed. In another specimen each of the two fertile spikes consists of a simple green lamina with a marginal row of fruit on each side slightly inrolled, and only partially pinnatifidly divided into wholly fertile divisions at the extreme apex.

Cheilanthes Lindheimeri, Hook.—This remarkable and exceedingly beautiful fern seems to hold to its characters with more constancy than any other member of the group to which it belongs, and is almost always easily determined.

Cheilanthes lanuginosa, Nutt., *Cheilanthes tomentosa*, Link—some specimens near var. *Eatoni*, Davpt., *Notholæna Hookeri*, D. C. Eaton, *Notholæna nivea*, Desv., var. *dealbata*, Davenp., *Notholæna sinuata*, Kaulf. and *Asplenium parvulum*, H. & G., also occur in this fine collection of ferns, which consists of some eighteen specimens in all.

With the ferns came two forms of *Selaginella rupestris*, Spring, the pretty *Selaginella apus*, Spring, with which our eastern botanists are familiar, and finely fruited specimens of *Marsilia macropoda*, A. Br.

The whole collection was made during the botanical tour through southwestern Texas, by Mr. Reverchon and wife, in May and June, 1885, which he has so pleasantly described in the *Botanical Gazette* for March, 1886.

Flora of Richmond County, N. Y. Additions and New Localities, 1885.

Podophyllum peltatum, L. Pleasant Plains, (Miss Rich.)

Berberis vulgaris, L. Abundant at Tottenville.

Caulophyllum thalictroides, Michx. New Springville.

Nymphæa odorata, Ait., var. *minor*, Sims. Four Corners.

Papaver dubium, L. New Dorp. (Miss E. G. Knight.)

Papaver somniferum, L. Port Richmond.

Nasturtium palustre, DC. Stapleton Flats. (Miss C. O. Thompson.)

Erysimum cheiranthoides, L. In a field near Kreischerville.

Erysimum orientale, Br. Stapleton Flats. (Miss Thompson.)

Hesperis matronalis, L. Escaped near the Poor House.

Rapistrum rugosum, L. Stapleton Flats. (Miss Thompson.)

Lychnis vespertina, Sibth. New Brighton. (Miss Thompson.)

Rhus typhina, L. Tottenville, (W. T. Davis), Princes Bay.

Trifolium hybridum, L. New Dorp. (Miss E. G. Knight.)

Vicia Cracca, L. Richmond Village.

Lathyrus paluster, L. Garretsons, also a form intermediate between this and the var. *myrtifolius*, Gray.

Lespedeza reticulata, Pers. Frequent.

Prunus Pennsylvanica, L. Silver Lake. (Wm. T. Davis.)

Drosera rotundifolia, L. Tottenville.

Callitriche heterophylla, Pursh. Huguenot.

Scabiosa arvensis, L. Field near Richmond. (Miss Knight.)

Dipsacus sylvestris, Mill. Brickyards, Green Ridge.

Lonicera ciliata, Muhl. Hills back of Garretsons.

Coreopsis discoidea, Torr. and Gray. Huguenot.

Heliopsis bupthalmoides, Dunal. (?) Tompkinsville. (Miss C. O. Thompson.)

Lactuca Scariola, L. New Brighton. (Miss Thompson.)

Centaurea Cyanus, L. New Brighton. (Dr. F. Hollick.)

Hieracium aurantiacum, L. New Dorp and Pleasant Plains.

Hieracium Marianum, Willd. Frequent.

Vaccinium corymbosum, L., var. *glabrum*, Gray, Staten Island, (W. H. Leggett); var. *amoenum*, Gray, Giffords; var. *atrococcum*, Gray, Huguenot.

Campanula rapunculoides, L. Streets of New Brighton.

Verbascum Lychnitis, L. New Brighton. (Wm. Chorlton.)

Echium vulgare, L. Abundant in a field near the Poor House.

Lycopsis arvensis, L. In ballast at Stapleton. (Miss Thompson.)

Petunia nyctaginifolia. New Dorp and New Brighton, escaped.

Utricularia gibba, L. Tottenville. (W. H. Leggett.)

Lycopus Europæus, L. Clove Lake and tributaries.

Thymus vulgaris, L. Clifton, 1864. (W. H. Leggett.)

Salix fragilis, L. New Dorp and Princes Bay, commonly bearing branched catkins, (See Bulletin, vol. vi., p. 312)

Salix cordata, Muhl., var. *angustata*, Gray. Tottenville.

Smilax tamnoides, L. Sparingly near Kreischerville.

Potamogeton pusillus, L., var. *tenuissimus*, Fries. Clove Lake.

Muscari racemosum, Mill. Huguenot and New Brighton.

Chamælirium Carolinianum, Willd. Clove Lake.

Juncus acuminatus, Michx., var. *debilis*, Englm. New Dorp.

Cyperus diandrus, Torr., var. *castaneus*, Torr. Frequent.

Carex lagopodiodes, Schk. Staten Island. (W. H. Leggett.)

Carex laxiflora, Lam., var. *blanda*, Boott. Garretsons; var. *plantaginea*, Boott., near Clove Lake.

Eatonia Dudleyi, Vasey, ined. Giffords, (W. H. Leggett); near Garretsons.

Panicum microcarpum, Muhl. Court House.

Panicum nitidum, Lam. Frequent, also a hairy form answering the description of *P. pubescens*, Lam.

Panicum discolor, Chapm. Todt Hill and Tottenville, (Named by Mr. F. L. Scribner.)

Setaria Italica, Kunth. Roadsides near Richmond.

Botrychium ternatum, Swartz, sub-var. *intermedium*, Eaton. Tottenville and Garretsons.

Lycopodium complanatum, L., var. *sabinæfolium*, Gray. Ocean Terrace.

Three former lists of additions to our Catalogue of Staten Island Plants have been published in this Bulletin (vol. vii., pp. 11-12; vol. viii., p. 48; vol. ix., pp. 149-151; and vol. xii., pp. 38-40; these have all been reprinted and will be furnished to those desiring them on application to either of the undersigned.

ARTHUR HOLLICK.
N. L. BRITTON.

Index to Recent American Botanical Literature.

Abies pungens. (Gard. Month., xxviii., pp. 112, 113; with figure.)

Aster ptarmicoides. T. & G. (Gard. Chron., xxv., p. 21; four figures.)

Botany as a Recreation for Invalids. Miss E. F. Andrews. (Pop. Sci. Month., xxviii., pp. 779-781.)

Carpenteria Californica, Torrey. (Garden, xxix., p. 312; one figure.)

This beautiful evergreen shrub has been distributed in Europe by M. Victor Lemoine, of Nancy, who succeeded in flowering it at his establishment in 1884. It is said to be one of the greatest acquisitions among shrubs of the last half-dozen years. At the time Mr. Watson's Botany of California was written, it was only known to American botanists from fruit. It was first collected by Gen. Fremont on the head waters of the San Joachim River.

Catalogue of the Phænogamous and Vascular Cryptogamous Plants of Fitchburg, Mass., and vicinity. Published under the direction of E. Adams Hartwell, Fitchburg High School; pamphlet, pp. 39, 1885.

A neatly printed list of 816 species and varieties, of which forty-one are Pteridophyta. Certain species are recorded whose occurrence in the region we are disposed to question. Among these are *Erigeron glabellum,* Nutt., *Brachychæta cordata,* Torrey and Gray, *Solidago petiolaris,* Ait., *Corallorhiza Macræi,* Gray, *Juncus Elliottii,* Chapm., and *Cyperus Haspan,* L. The authors describe a new species of violet, *V. parva,* which is probably one of the multitudinous forms of one of the common species. It would have been better for the industrious editors of this catalogue to have consulted one of the large public herbaria before admitting plants whose hitherto known range probably excludes them from their district.

Durability of Resinous Woods. Heinrich Mayr. (Pop. Sci. Month., xxviii., pp. 679 683.)

Fungi.—Notes on some published species of. J. B. Ellis. (Journ. Mycol., ii., pp. 43, 44.)

Lettuce Mildew. (Perenospora gangliformis, De B.*)* J. C. Arthur. (Fourth Ann. Rep. N. Y. State Agric. Exper. Station, pp. 253, 254; one figure.)

Lettuce Rust. J. C. Arthur. (Fourth Ann. Rep. N. Y. Agric. Exper. Station, pp. 250-252; one figure.)

This disease first makes its appearance in the older leaves of the lettuce plants, which turn brown and appear as though prematurely aged. Both surfaces are found to be covered with minute specks the perithecia of the fungus known in this stage as *Septoria Lactucæ,* Pers. Its further life history is as yet unknown, and no remedy has been discovered.

Mycologic Flora of the Miami Valley. A. P. Morgan. (Journ. Cincinnati Soc. Nat. Hist,, iv., pp. 1-8 ; continued.)

This contribution completes the list of *Polyporei.*

New Species of Fungi from various localities. J. B. Ellis and B. M. Everhart. (Journ. Mycol., ii., pp. 37-42.)

Twenty-three new forms are described.

Notes of a Visit to North America, as Delegate to the British Association meeting at Montreal, etc. W. Caldwell Crawford. (Trans. and Proc. Bot. Soc. Edinburgh, xvi., pp. 269-272.)

Osmunda Claytoniana.—Branching of. A. A. Crozier. (Amer. Nat., xx., p. 379; three figures.)

Pear Blight. (*Micrococcus amylovorus,* Burrill.) J. C. Arthur. (Fourth Ann. Rep. N. Y. Agric. Exper. Station, pp. 241-248.)

Mr. Arthur describes his methods of investigation of the cause of this disease, and reaches the conclusion that it is directly due to a specific microbe which Professor Burrill has described under the above name; the germs gain entrance to the tissues through the tender surfaces of flowers and new shoots; they may grow in dead organic matter outside of the trees, but on again entering the tissues are able to produce the disease in its full virulence. No formation of spores has yet been detected.

Peziza.—Notes on. J. B. Ellis. (Journ. Mycol., ii., pp. 44-47.)

Protococcus viridis. E. B. Southwick. (Journ. N. Y. Micros. Soc., ii., 1-8 ; one plate.)

An interesting account of the growth of this organism on one hundred species of trees in Central Park, New York city, and on stone walls of the vicinity. It is most abundant on northern and northwestern exposures. Its appearance on the American Elm is illustrated.

Protococcus viridis.—Notes on. P. H. Dudley. (Journ. N. Y., Micros. Soc., ii., pp. 9-12; one plate.)

Spotting of Quince Fruit. J. C. Arthur. (Fourth Ann. Rep. N. Y. Agric. Exper. Station, p. 249; two figures.)

The dark-colored spots on quinces are caused by the growth of the fungus *Morthiera Mespili*, Fickl., var. *Cydoniæ*, C. and E. The mycelium colors the pulp brown for a short space below the surface, and the limits of its action are distinctly marked. The appearance and money value of the fruit are affected; no preventive nor remedy is known.

Tree Growth on the Plains. (Amer. Nat., xx., pp. 380, 381.)

Prof. Bessey extracts from a recent paper by Robert W. Furnas on "Tree Planting on the Plains," a tabulated statement of the size reached by twenty-one different trees, varying from fourteen to twenty-five years of age.

Tree Measurements. Prof. J. C. Smock. (Gard. Mon., xxviii., p. 111.)

Prof. Smock contributes measurements of a number of forest trees growing near Holmdel, Monmouth Co., N. J., averaging thirty years old. The Red Maple has a circumference of 71 inches; the American Elm, 60; the Tulip Tree, 63; the Locust, 48; the American Larch, 42. The comparative sizes which our trees may reach in a given number of years is a matter of great importance, and every accurate measurement made and recorded, is a useful contribution to the subject.

Trichomanes Petersii, Gray.—*Proliferation in.* (Gard. Chron., xxv., p. 372; one figure.)

Weeds and their fungous Parasites. J. C. Arthur. (Fourth Ann. Rep. N. Y. State Agric. Exper. Station, pp. 262-265.)

Western American Firs. C. S. Sargent. (Gard. Chron., xxv., p. 20.)

Mr. Sargent expresses the opinion that the *Abies grandis* of Oregon, *A. lasiocarpa* of California, and *A. concolor* of Utah, Arizona, New Mexico, etc., are but forms of a single species of great geographical range.

Botanical Notes.

The annual election of officers for the *Syracuse Botanical Club* resulted as follows: Mrs. L. Lenora Goodrich, Pres.; Mrs. Kate Barnes, Vice-Pres.; Miss Sarah E. Cobb, Cor. Sec; Miss Minnie Overacker, Rec. Sec.; Mrs. Dora E. Griffin, Treas; Mrs. M. Still and Miss Frances Case, Executive Committee.

Proceedings of the Club.

Professor W. G. Farlow, of Cambridge, Mass., delivered the first of a series of public lectures before the Club on the evening of April 9th. His subject was "Fungous Diseases of Plants." It was effectively illustrated by diagrams and lantern slides. At the close of the address, on motion of Vice-President Hogg, a vote of thanks was tendered Prof. Farlow.

The regular monthly meeting was held at Columbia College, Tuesday evening, April 13th. The President was in the chair, seventeen persons were present. The Finance Committee reported the purchase of the remaining numbers of Volumes I to VI of the BULLETIN from the Misses Leggett. Dr. George D. Hays and S. Lowell Elliott were elected active members, and Prof. George Lincoln Goodale, W. G. Farlow and F. Lamson Scribner, corresponding members. Several members of the Club, who have been engaged in the study of Microscopic and Cryptogamic Botany, having organized a section to be known as the HISTOLOGIC AND CRYPTOGAMIC SECTION OF THE TORREY BOTANICAL CLUB, were formally accorded that title and the privilege of organizing and meeting in such manner as they may decide.

The Field Committee of last year, Messrs. W. H. Rudkin, J. F. Poggenburg and Arthur Hollick, was reappointed. Mr. Southwick reported seventeen cultivated plants in bloom in Central Park. Mr. Hollick showed *Epigæa repens*, collected on April 11th on Staten Island. Dr. Newberry read a description of certain fossil forms of *Bauhinia*, illustrating it with drawings of the recent species. He also read from the Amherst Record a notice of the death of Prof. Edward Tuckerman, and gave some personal reminiscences. Mr. E. P. Bicknell reported finding *Pellæa atropurpurea* on limestone rocks at Riverdale-on-Hudson. Dr. Britton called attention to a specimen of *Eryngium planum*, Juss., found in Central Park by L. P. Gratacap. Mrs Britton showed cones of *Abies balsamea* and *Picea nigra*, from Mt. Mansfield, Vt., *Abies Fraseri* and *Picea alba* from the Southern Alleghanies, and explained their differences.

The paper announced for the evening, entitled "Additions to the Flora of Richmond County," by Arthur Hollick and N. L. Britton, was read by Mr. Hollick and illustrated with specimens.

Bulletin Torrey Botanical Club. Plate lvii.

Fig. 2.

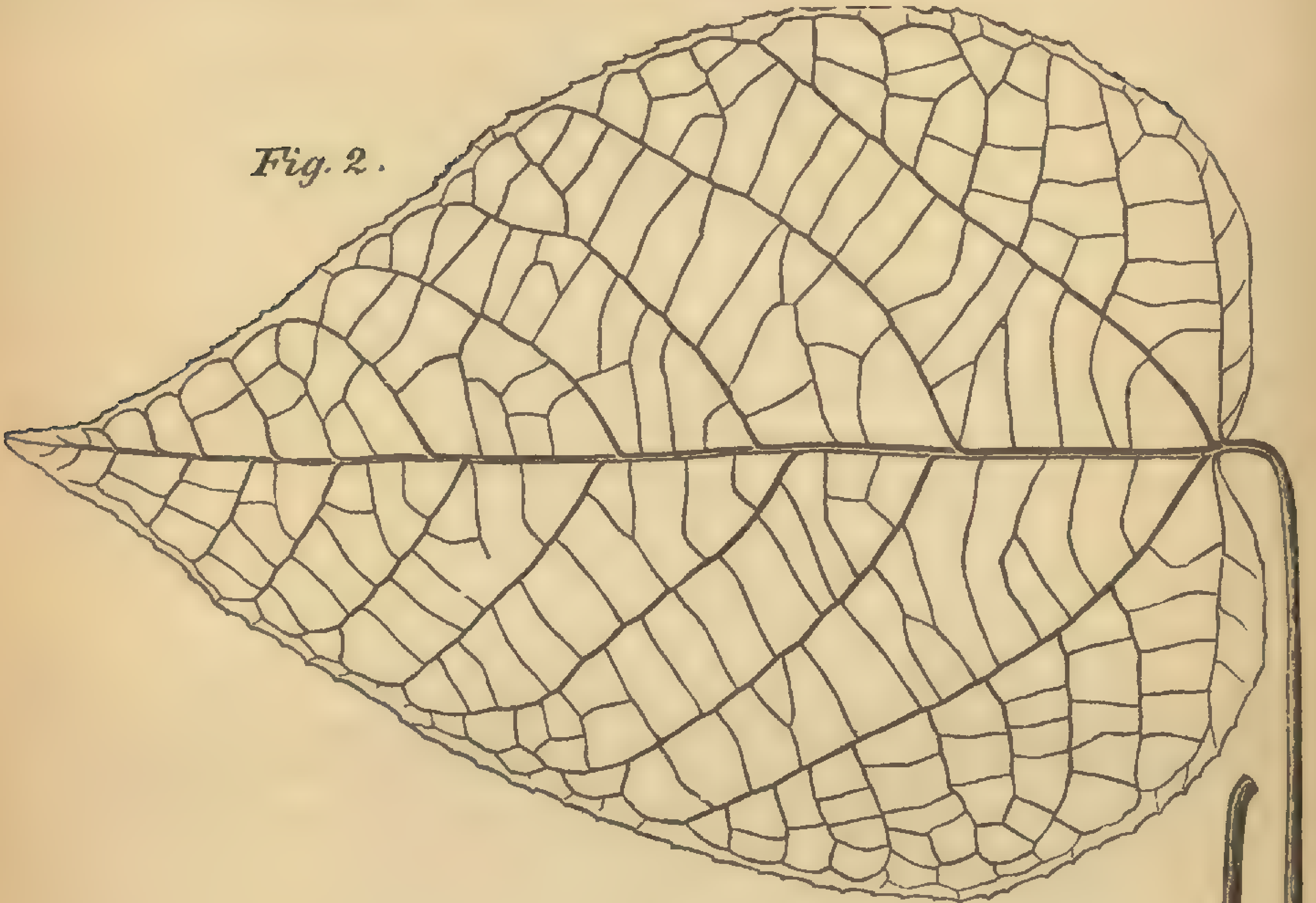
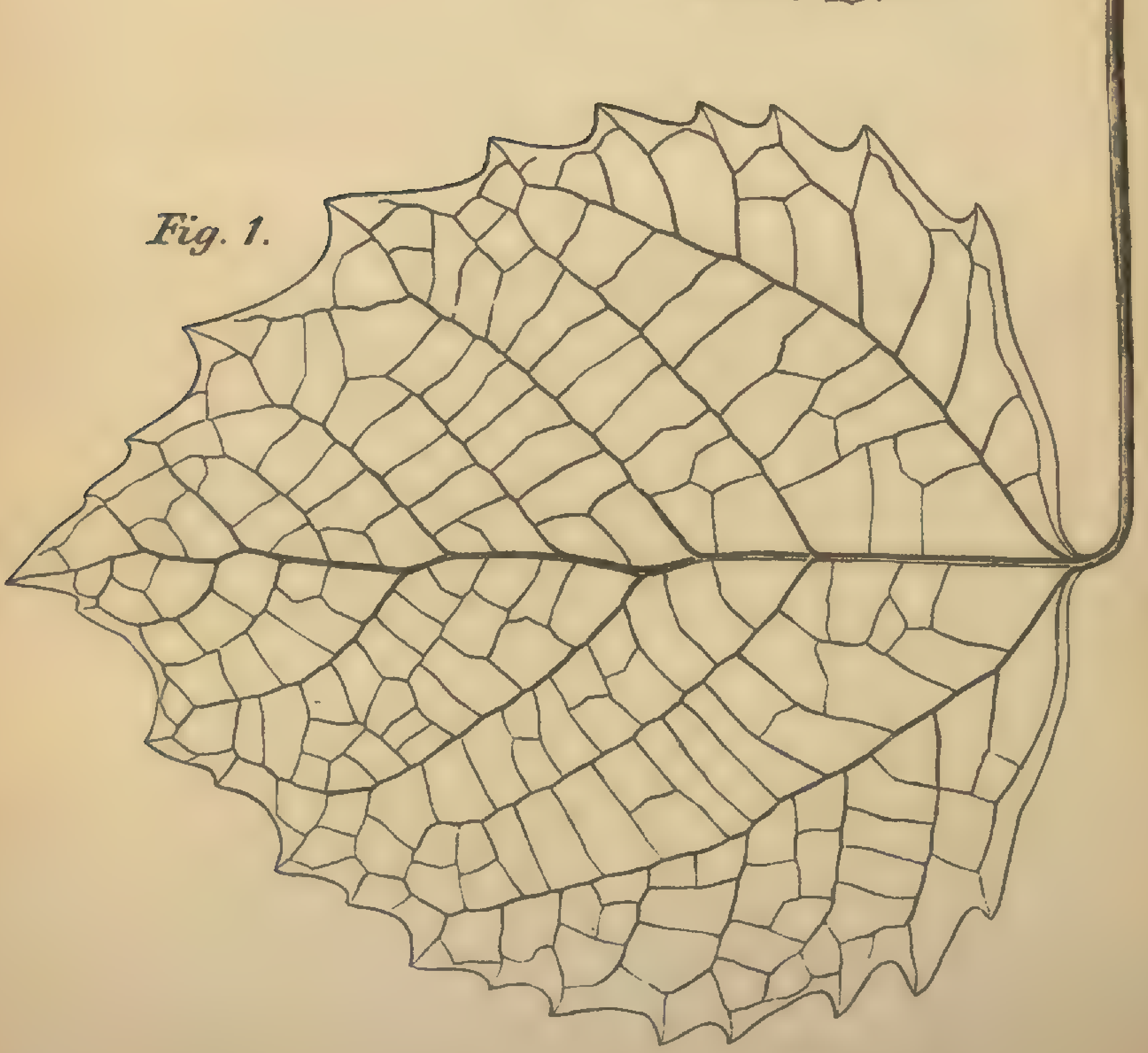


Fig. 1.



BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XIII.] New York, June, 1886. [No. 6.

Leaf-forms of Populus grandidentata.

By N. L. Britton.

Plate LVII.

The difference in the form and outline of leaves borne by individual plants of different ages, though belonging to a single species, has often been the subject of remark. It is specially noticeable in trees, and all are familiar with the variation exhibited in this respect by Oaks, where it generally appears in larger, evidently more vigorous leaves, having less serration or lobing on the younger plants than on older ones. To this general habit the Poplars are no exception, but exhibit it, in certain cases, to a remarkable degree.

For several years I have repeatedly noticed sapling Poplars, in many places in the woods, bearing very large, ovate-cordate, serrulate, commonly somewhat acuminate leaves, their upper surfaces glabrous, the lower densely covered with a fine tomentum, which under the microscope is seen to consist of slender, simple hairs, extending over the very prominent veins, and commonly present on the petioles and young shoots. Until quite recently I had not been able to ascertain to which species these leaves belong. Their outline and serration somewhat resemble those of adult Cottonwoods (*P. monilifera*), specimens collected on the Palisades in October, 1883, being very much like these in outline; the tomentose lower surfaces suggested *P. heterophylla*, but no large trees could be found. In August of last year I obtained what would appear to be actual proof that they are borne by young trees of *P. grandidentata.* I first observed the relation of the two at a place on the banks of the Morris Canal, near Waterloo, New Jersey, while in company with Professor Porter, but later noticed it in several other localities. The adult trees of the Large Aspen were accompanied by numerous small ones bearing the tomentose, serrulate leaves in question. I could not definitely ascertain whether these saplings were root-suckers or seedlings, but as I have since been unable to find the peculiar leaves on the former, I suppose they were seedlings. On these small trees the tomentose leaves remain until they naturally drop off in the autumn, and I have so far seen but a single one of the two types on the same individual tree. The age when the normal leaves first appear I have been unable to determine, and it may vary in different localities; the tomentose forms were, however, seen on plants eight to ten feet high. The text-books make no allusion to this remarkable variation in leaf-form, nor have I been able to find it recorded in any literature at my command; frequent mention is made of the woolly surfaces of ordinary young leaves, a feature which exists even on those of large trees. The system of primary nervation is much the same in both types, though in the leaves of the saplings here alluded to, the mid-vein is straighter, and the disposition of the veinlets differ also in details.

Populus grandidentata was named by the elder Michaux (Flor. Bor. Amer., ii., p. 243.) He notes the villose younger leaves, but makes no reference to the serrulate ones of saplings. *P. heterophylla* is a Linnæan species, (Spec. Plant., 1st Ed., p., 1034; 3d Ed., p. 1464), but the diagnosis given is simply "Populus foliis cordatus primoribus villosus." Now, a question arises as to which species Linnæus actually had. The above short description might apply equally well to the leaves of both, now that we have shown the character of sapling leaves of *P. grandidentata*. It would appear that Linnæus had not seen the fruit. The leaves of the Swamp Poplar, (*P. heterophylla*), so far as the living trees and herbarium specimens which I have seen represent it, vary very little in shape; they are quite uniformly broadly ovate, obtuse, and generally though not invariably cordate, so that the Linnæan name does not well apply to them. In the Sylva Americana the tree is called *Populus argentea*, which is a better name for it, while *heterophylla* would apply very well to the Large Aspen. Is it possible that Linnæus was aware of the variation described at the present time? The two species are very distinct, the racemose fertile inflorescence of the Swamp Poplar being characteristic, and not met with, I believe, in any other American species. In fruit the pedicels become half an inch or more in length, a character noted in Wood's Class Book.

I hope that the presentation of this subject at the present time may direct attention to these trees and that additional observations may be placed on record.

EXPLANATION OF PLATE LVII.

Fig. 1. Normal leaf of *Populus grandidentata*.
Fig. 2. Young sapling leaf of the same species.

Duct Formation in Chestnut Wood.

By P. H. Dudley.

The large ducts in the inner portion of each annual ring of Chestnut wood are very conspicuous, attracting attention at once in the tranverse and radial sections. When cut slightly obliquely in the tangential section they form the beautiful and attractive contrast to the ordinary wood-cells which has long made the second growth of this wood so desirable for the interior finishing of cars, and, more recently, of houses. The large ducts form in one, two, and sometimes three quite distinct concentric rows in the early spring growth of each annual ring. The rings are not always alike in the same tree, owing to varying conditions of growth in different seasons, and marked variations are found in trees from different localities. Some of the ducts appear as soon as the wood-cells, being formed adjacent to the cells of the preceding year's growth, while others have only from one to three rows of cells between. In a specimen cut on May 1st, one row of ducts and eighteen rows of wood-cells had already formed. The leaves of this tree were only about one inch long and one-fourth of an inch wide, yet some of the ducts were of full size, well formed, having septa and well defined walls. In certain sections were found ducts evidently forming; they were small, but with distinct walls. Around these the wood-cells were of the usual shape and not much flattened, and the medullary rays not much bent out of their course. After comparing a number of more or less advanced ducts, it now seems to me that they increase in size by expansion instead of by absorbing the surrounding cells. If the formation of these ducts were a process of absorption, some of the medullary rays should end at the ducts, and not be flattened around them, as I have found to be the case in all specimens so far examined. In the section before mentioned the cambium layer is but two or three rows of cells in advance of the first row of ducts.

On treating the newly formed wood-cells with Indol, fourteen rows gave the so-called reaction for lignine, the indications being principally confined to the lamellæ joining the cells. In the most delicate tests for lignine with this reagent I find that in the older wood-cells the lamellæ joining them give the most decided reaction; in fact, some woods, especially the bast fibres, give a reaction upon applying the proper acid before adding the Indol.

In regard to the arrangement of the ducts in the completed annual growth, we see that as the wood-cells grow and the ring thickens, the ducts are inclined through the ring becoming smaller and smaller until in the outer portion in this wood they are but little larger than the ordinary wood-cells. This last feature is only true of some of the Angiosperms; in others the ducts are practically the same size in all parts of the ring.

Surrounding both the large and small ducts are series of small tracheids, their thin places being very small and delicate. Interspersed among the ordinary wood-fibres are cells which, in the alburnum, are filled with starch during a portion of the year. In some instances they are provided with septa, in others they appear like round-ended cells one above the other. In transverse sections, these are seen to be arranged in irregular rows at right angles to the medullary rays, so that the wood is divided off into small rectangles of three to four rows of cells on a side surrounded by starch-carrying cells on all four sides. The function of these latter cells is not fully explained, but for a portion of the year they serve the purpose of storehouses for reserve material. In the specimen cut on the 1st of May the cells seem more densely packed than in any others that I have examined cut in the months from September to the present time. Later, when the tree has developed its leaves and flowered, I expect to find these cells nearly or quite empty.

Wood of the White Oak cut on the same date had one row of ducts formed and many rows of wood-cells. The Hemlock had not formed any wood-cells. Branches taken on May 9th from the Horse Chestnut, and also from Lilacs which were in full leaf and flower, had only traces of starch in the medullary rays.

Plants of the Detroit River.

BY DOUGLASS H. CAMPBELL.

The accompanying list of plants was made during a month's visit to Grosse Isle, near the mouth of the Detroit River. in the summer of 1885. A large part of the shore of the river on both sides. and along the numerous islands is occupied by extensive marshes, which afford an extraordinarily rich harvest to the botanist. The list here given is, of course, imperfect, but will give some idea of the great variety of forms, especially among the Algæ.

PROTOPHYTA.—*Glœococcus ampla*, Kutz.; *Chlorococcus gigas*, Grun. (?); *Cœlosphærium Kutzingianum*, Næg.; *Nephrocytium Nægelii*, Rabh.; *Raphidium falcatum*, Corda; *Scenedesmus quadricauda*, Breb.; *S. acutus*, Mey.; *Nostoc sphæricum*, Men.; *N. commune*, Vauch.; *Anabæna Thwaitesii*, Ralfs; *Cylindrospermum macrospermum*, Kutz.; *Merismopedia glauca*, Næg.; *M. violacea*, Kutz. (?); *Oscillaria insignis*, Thw.; *O. æruginescens*, Drum.; *O. tenuis*, Ag.; *Spirulina oscillarioides*, Turp.; *Rivularia echinata*, Eng. Bot.; *R. dura*, Kutz.; *R. calcarea*, Eng. Bot. (?).

ZYGOPHYTA.—*Conferva fontinalis*, Berk.; *Microspora floccosa*, Thur.; *Sorastrum spinulosum*, Næg.; *Cladophora glomerata*, L.; *C. flavescens*, Ag.; *Chætophora endiviæfolia*, Ag.; *C. pisiformis*, Ag.; *C. elegans*, Ag.; *Pediastrum pertusum*, Kg.; *P. Ehrenbergii*, A. Br.; *P. Boryanum*, Turpin; *P. constrictum*, Hass. *Desmidium aptogonium*, Breb.; *D. Baileyii*, Ralfs. *Docidium Trabecula*, Næg.; *D. crenulatum*, Rab.; *Cosmarium cruciatum*, Breb.; *C. protractum*, Arch.; *C. Botrytis*, Menegh.; *C. margaritiferum*, Menegh.; *C. bioculatum*, Breb.; *C. dentatum*, Wolle; *C. ornatum*, Ralfs, var. *protractum*, Wolle; *C. intermedium*, Delp.; *C. nitidulum*, DeNot.; *C. Portianum*, Arch.; *C. Ralfsii*, Breb.; *Staurastrum eustephanum*, Ralfs; *S. gracile*, Ralfs; *S. punctulatum*, Breb.; *S. Brebissonii*, Arch.; *S. arctiscon*, Ehrb.; *S. polymorphum*, Breb; *S. Avicula*, Breb.; *Euastrum elegans*, Kg.; *E. verrucosum*, Ralfs; *Xanthidium fasciculatum*, Ralfs; *X. antilopæum*, (Breb.) Kg; *Closterium costatum*, Corda; *C. Venus*, Kg.; *C. Ehrenbergii*, Menegh., var. *immane*, Wolle; *C. rostratum*, Ehrb.; *C. Leibleinii*, Kg.; *C. acerosum*, Ehrb.; *C.*

moniliferum, Ehrb.; *C. Dianæ*, Ehrb.; *C. strigosum*, Ehrb.; *C. Cucumis*, Ehrb.; *C. subtile*, Breb.; *Micrasterias fimbriata*, Ralfs; *M. furcata*, Ralfs; *M. laticeps*, Nord.; *M. truncata*, (Corda) Ralfs; *Zygnema stellinum*, Vauch.; *Z. insigne*, Kutz.; *Spirogyra flavescens*, Hass.; *S. longata*, Vauch.; *S. crassa*, Kutz.; *Staurospermum viride*, Kutz.; *Mesocarpus scalaris*, Hass.

OOPHYTA.—*Œdogonium capillare*, L.; *Œ. paludosum*, Hass.; *Œ. depressum*, Prings.

CARPOPHYTA.—*Coleochæte orbicularis*, Prings.; *C. scutata*, Breb.; *C. soluta*, Prings. Fine specimens of *C. pulvinata* were gathered near Detroit in September.

PTERIDOPHYTA.—*Equisetum limosum*, L.

PHANEROGAMIA.—*Zizania aquatica*, L.; *Heleocharis obtusa*, Schultes; *Pontederia cordata*, L.; *Iris versicolor*, L.; *Anacharis Canadensis*, Planch.; *Vallisneria spiralis*, L.; *Alisma Plantago*, L., var. *Americanum*, Gray; *Saggittaria variabilis*, Engelm.; *S. heterophylla*, Pursh.; *Potamogeton pectinatus*, L; *P. pusillus*, L.; *P. compressus*, L.; *P. perfoliatus*, L., and var. *lanceolatus*, Robbins; *P. lucens*, L., and var. *minor*, Nolte; *P. natans*, L.; *P. lonchites*, Tuck.; *Naias flexilis*, Rostk.; *Typha latifolia*, L.; *Sparganium eurycarpum*, Engelm.; *S. simplex*, Hudson; *Lemna trisulca*, L.; *L. minor*, L.; *L. perpusilla*, Torrey; *Speirodela polyrrhiza*, Schleid.; *Wolffia Braziliensis*, Weddell; *W. Columbiana*, Karsten.; *Acorus Calamus*, L.; *Polygonum amphibium*, L.; *Utricularia vulgaris*, L.; *U. minor*, L.; *Nesæa verticillata*, HBK.; *Hibiscus Moscheutos*, L.; *Nymphæa tuberosa*, Paine; *Nuphar advena*, Ait.; *Nelumbium luteum*, Willd.; *Ranunculus aquatilis*, L.

Additions to the Westchester County Flora.

The following plants which I have in my Herbarium from various stations in Westchester County, N. Y., are not recorded in Dr. Willis' Catalogue of the plants of that county:

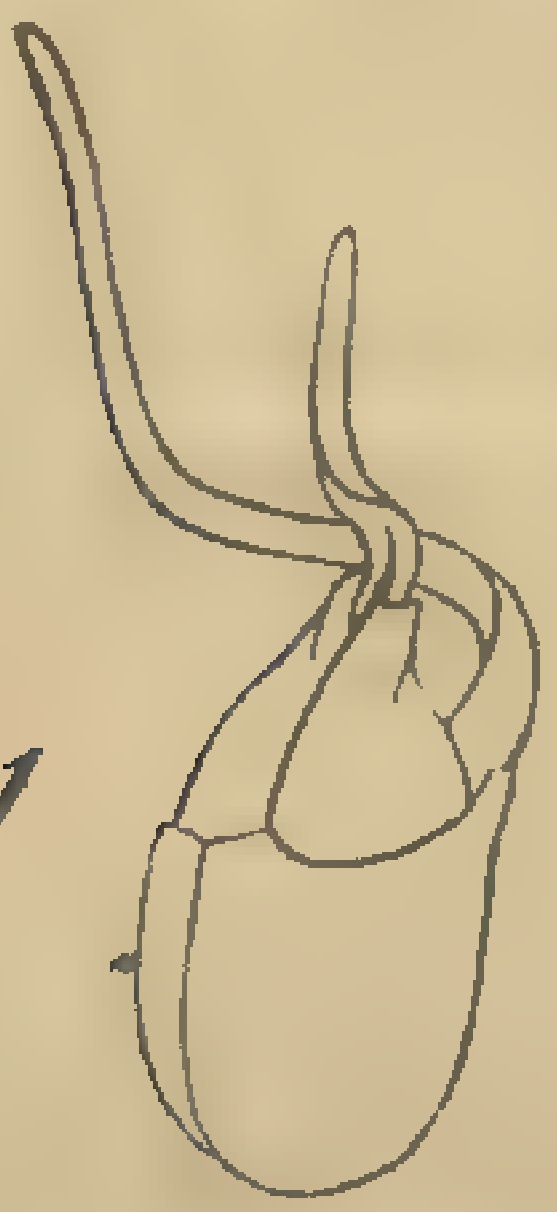
Corydalis flavula, Raf., near Anthony's Nose; *Spergularia media*, Presl., New Rochelle; *Hibiscus Syriacus*, L., Pelham; *Euonymus Americanus*, var. *obovatus*, Torr. and Gray, Upper New Rochelle; *Cratægus Oxyacantha*, L., Pelham Neck; *Prunus Virginiana*, L., New Rochelle; *Pyrus arbutifolia*, L., var.

melanocarpa, Torr. and Gray, New Rochelle; *Amelanchier Canadensis*, Torr. and Gray, var. *oblongifolia*, Gray, Huckleberry Island; *Carum Carui*, L., spontaneous at New Rochelle; *Valeriana officinalis*, L., Pelham Neck; *Plantago decipiens*, Barneoud, New Rochelle; *Veronica Buxbaumii*, Terore, New Rochelle; *Calystegia sepium*, R. Br., var. *repens*, Gray, Pea Island; *Asclepias incarnata*, L., var. *pulchra*, Pers., Pelham; *Potamogeton pusillus*, L., Portchester; *Spartina cynosuroides*, Willd., Hunter's Island; *Tripsacum dactyloides*, L., Hunter's Island.

EDWARD H. DAY.

Plurality of Embryos in Quercus alba.

On Staten Island, in March, 1886, we found the acorns of the white oak, *Quercus alba*, which had sprouted, with radicles four or five inches in length. In pulling up a number of them we found one which differed from all the rest in being what I have called "*double*," having two radicles and four cotyledons. It resembled the others in the size and shape of the cotyledons, but these were divided one-third of the distance from the main radicle into two smaller irregular lobes, which gave rise in their turn to a smaller radicle. The above diagrams will illustrate the structure.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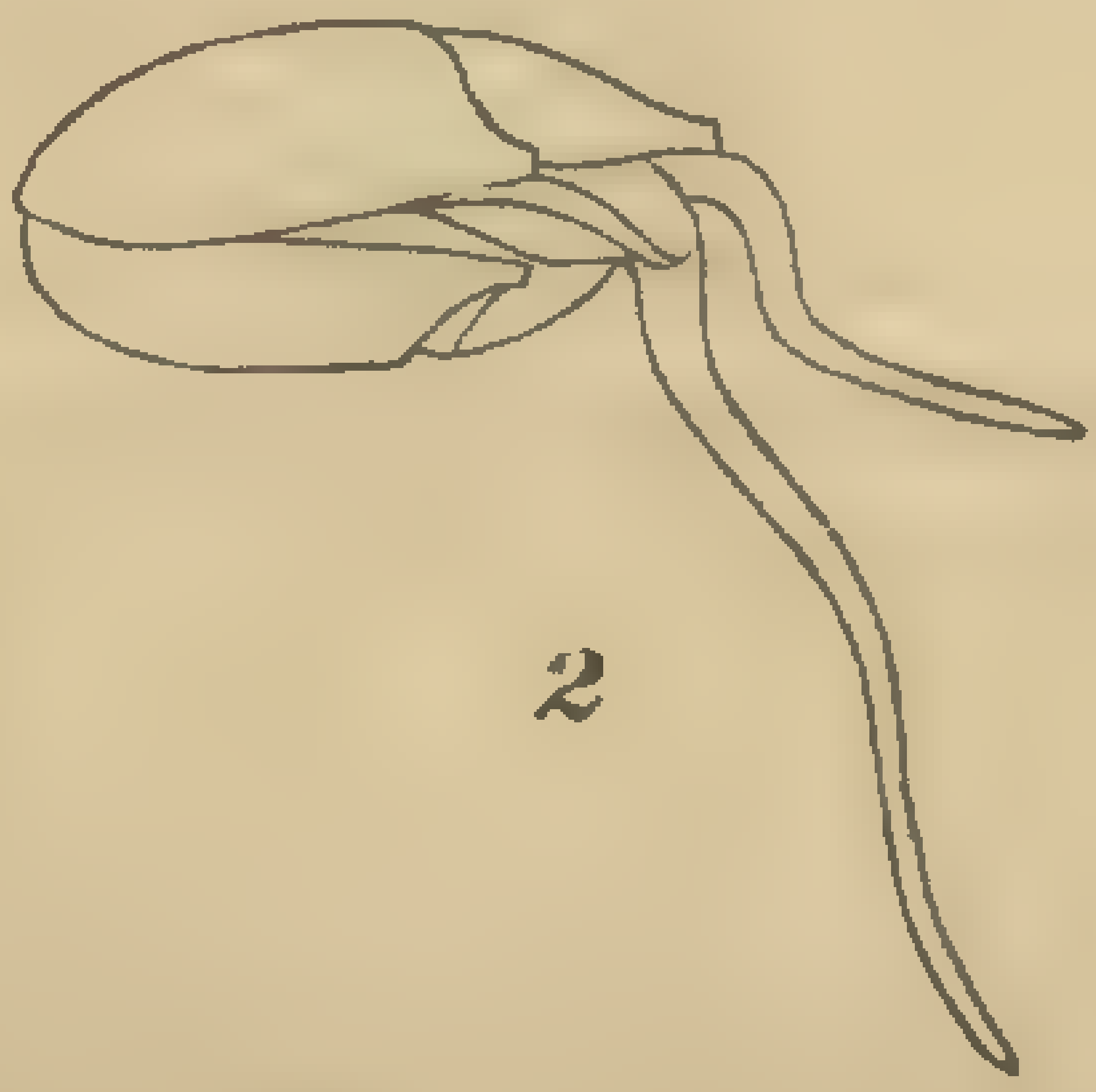
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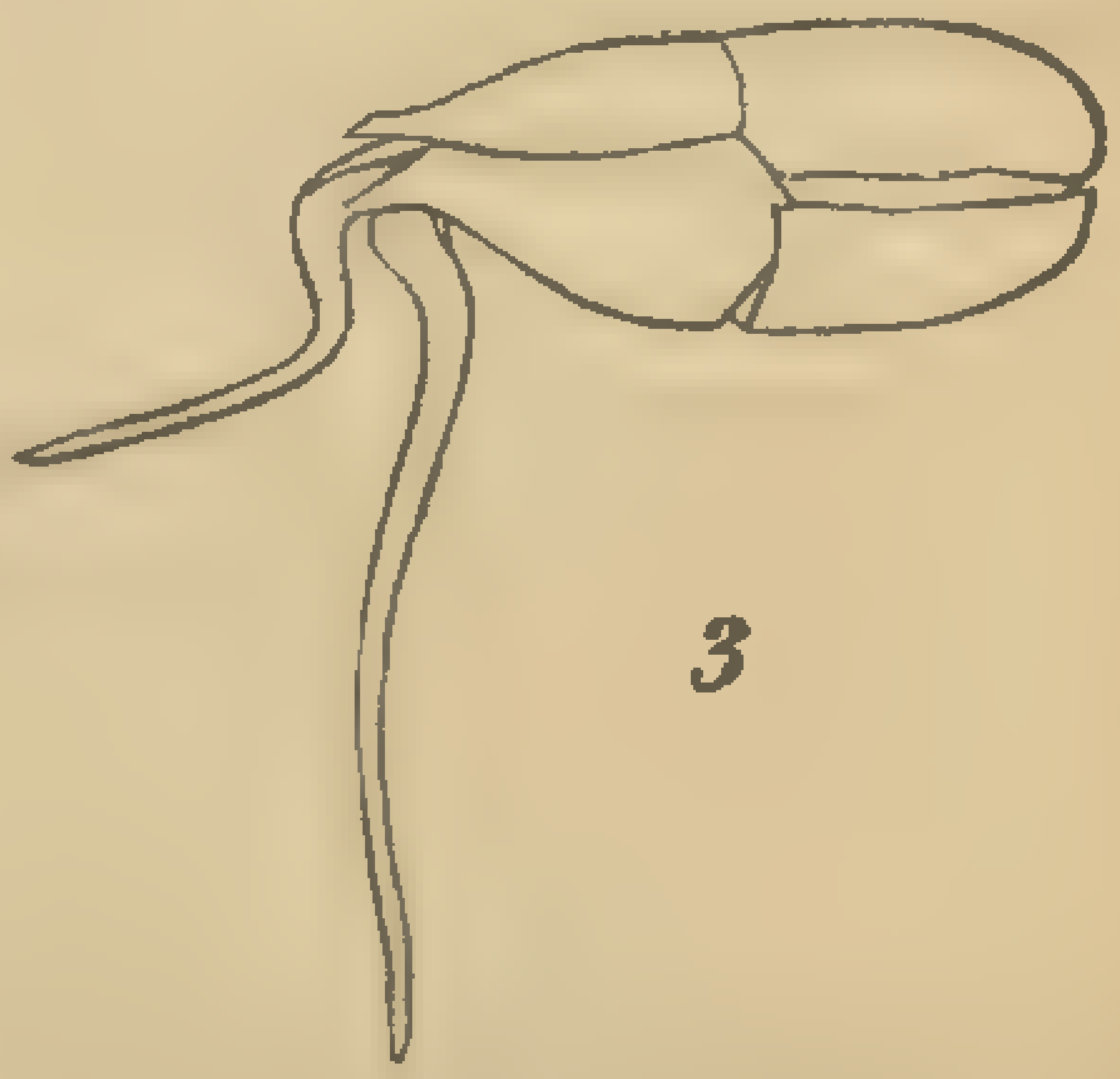
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E. G. B.

Index to Recent American Botanical Literature.

Æcidium Phrymæ, n. s. Byron D. Halsted. (Journ. Mycol., ii., p. 52.) This Æcidium was found on *Phryma Leptostachya*, at Spirit Lake, Iowa, in July, 1885.

Botanical Contributions, 1885. Asa Gray. (Proc. Amer. Acad. Arts and Sciences, xxi., pp. 363–413.)

I.—A Revision of the North American Ranunculi.—Since the publication of Torrey and Gray's Flora of North America no systematic arrangement of our Ranunculi has been attempted. A number of our species ars now referred to older names than those generally cited, and some additional ones are characterized. *R. aquatilis*, var. *divaricatus*, Gray, of the Manual (var. *stagnatilis*, DC.) is regarded as a good species under the name *R. circinatus*, Sibth ; *R. hederaceus*, L., occurs in fresh-water marshes at Norfolk, Va., probably introduced from Europe ; *R. triternatus*, Gray, is a new species from Klikitat County, Oregon, distributed by Howell, as *R. Hookeri; R. Arizonicus*, Lemmon, from the Southwest, is recognized, and two varieties of it are noted ; *R. Suksdorfii*, from Mt. Adams, Washington, is here first described; *R. occidentalis*, Nutt., includes *R. Nelsoni*, Gray, and five varieties are made of it ; *R. acriformis*, Gray, from the Rocky Mountains, is the *R. acris* of Hooker. *R. hispidus*, Michx., a northern and western species, is distinguished from *R. Pennsylvanicus*, L. f ; *R. septentrionalis*, Poir., includes most of our forms which have gone as *R. repens*, L., the latter species being mainly confined to low grounds near the coast, where it has been introduced, but is also indigenous in some localities ; *R. fascicularis*, Muhl., is regarded as distinct.

II.—Sertum Chihuahuense :

The second section of Dr. Gray's Contributions describes new and noteworthy species of Gamopetalæ collected in various parts of Chihuahua by Mr. C. G. Pringle and Dr. Edward Palmer during the past year. One genus and a great many species new to science are here described.

In the third section the genera *Sidalcea*, *Lyonothamnus* and *Dimeresia* are discussed, and several new species of other genera are described.

Botanic Gardens. D. P. Penhallow. (Tenth Annual Report of the Montreal Horticultural Society, 1886.)

Cypripediums in America.—Hardy. Wm. H. Chadwick. (Gard. Chron., xxv., pp. 564, 565.)

Eatonia—Notes on. George Vasey. (Botan. Gazette, xi., pp. 116, 117.)

Dr. Vasey characterizes two new species of this genus, *E. Dudleyi*, which ranges from Michigan to Southern New York and southward to North Carolina, and *E. filiformis, (E. Pennsylvanica*, var. *filiformis)*, Chapm., found from Florida to Texas.

Edward Tuckerman, LL.D., Professor of Botany in Amherst College, and the only American authority on Lichenology, died at his residence on the 15th of March. From biographical notices which have appeared in the Amherst Record, written by his colleague, Professor Tyler, from an account of his botanical labors, written by Mr. Henry Willey for the Botanical Gazette, and published in the April issue of that periodical, and from Dr. Gray's sketch of this distinguished botanist in the American Journal of Science for April, we condense the following brief account: He was born in Boston, December 17, 1817; was graduated from Union College in 1837, and from tbe Harvard Law School in 1838. Subsequently he received the degree of M.A. from both Union and Harvard Colleges, and that of LL.D. from Amherst. His duties at Amherst began in 1854. He was first lecturer on history, then professor of Oriental history, and in 1858 was appointed professor of botany, which position he held till his death. While Professor Tuckerman's botanical work has mainly been in the field of Lichenology, and in this department he was probably as high authority as any other living student, his name is also associated with other plants. In 1843 he published a pamphlet entitled "Enumeratio Methodica Caricum Quarundum," in which 253 species of *Carex* were listed; his "Observations on Some American Species of *Potamogeton*," in the American Journal of Science of 1849, made known six new species of that genus. His last botanical contribution, entitled "Two Lichens of the Pacific Coast," was published in this BULLETIN for March, 1884.

Flora of Indiana—Origin of the. Harvey Thompson. (Botan. Gazette, xi., pp. 88–90.)

Fossil Dicotyledonous Leaves—On the Determination of. Lester F. Ward. (Amer. Jour. Science, xxxi., pp. 370–375.)

Fungi—Ellis and Everhart's North American.

The sixteenth and seventeenth centuries of this valuable distribution have recently been issued.

Fungous Diseases of Small Fruits. A. B. Seymour. (From Vol. xiv., Minnesota Horticultural Report; 8 pages.)

Germination of Pond Lily Seeds. George F. Waters. (Science, vii, 395, 396.)

Mr. Waters states that some seeds of *Nymphœa odorata* germinated after a submergence in water of nearly two years.

Grasses of Coulter's Manual. F. Lamson Scribner. (Botan. Gazette, xi., pp. 95-97.)

Mr. Scribner reviews and criticises the treatment of the order *Gramineæ* in Professor Coulter's Manual of the Botany of the Rocky Mountain Region.

Hypericaceæ—Revision of North American. John M. Coulter. (Botan. Gazette, xi., pp. 78-88, and 106-112.)

The three genera, *Ascyrum*, *Hypericum* and *Elodea*, are retained, in which the author differs from Bentham and Hooker, who in their Genera Plantarum refer the two species of the last to *Hypericum*. *Ascyrum Crux-Andreæ*, L., var. *angustifolium*, Nutt., is referred to *A. hypericoides*, L.; *A. microsepalum*, Torr. and Gray, becomes *Hypericum microsepalum*, Gray; *H. pyramidatum*, Ait., is *H. Ascyron*, L., occurring also in Europe and Northern Asia; *H. angulosum*, Michx., is *H. virgatum*, Lam., and *H. acutifolium*, Ell., is reduced to a variety of this species; *H. corymbosum*, Muhl., is *H. maculatum*, Walter; *H. Scouleri*, Hook., becomes a variety of *H. formosum*, HBK.; *H. Sarothra*, Michx., is *H. nudicaule*, Walter. Under *Elodea* of Jussieu (not *Elodes*, Adans.), *E. Virginica*, Nutt., becomes *E. campanulata*, Pursh.

Lilium Canadense. (Garden, xxix., pp. 426, 427; plate 543.) A description of its mode of growth and propagation with comparisons with other lilies accompanies the very pretty plate We are told that it is still imported into England in considerable quantities.

Mosses. The American Monthly Microscopical Journal, vii., pp. 86-88., reprints from Science Gossip, a popular article which contains nothing more than can be found in any text-book. It is illustrated by crude figures of *Funaria hygrometrica*, L.

Plant Dissection. J. C. Arthur, C. R. Barnes and J. M. Coulter. (8vo., pp. 256, Henry Holt & Co., New York, 1886.)

A useful guide for the study of a few common plants. The authors have modelled the work after Huxley and Martin's Elementary Biology, omitting however, all reference to physiology, and prefixing an introduction giving directions for the use of instruments and reagents; methods of cutting, staining, mounting and drawing objects under the microscope. The last point is illustrated by two plates. The work is outlined for the following plants: *Protococcus viridis, Oscillaria tenuis, Spirogyra quinina, Cystopus candidus, Microsphæra Friesii, Marchantia polymorpha, Atrichum undulatum, Adiantum pedatum, Pinus sylvestris, Avena sativa, Trillium recurvatum*, and *Capsella Bursa-pastoris.* Frequent references as foot-notes and a glossary, complete a very convenient little guide for the student both in the laboratory and at home. It embraces a wider field than Bower and Vine's Practical Botany, but goes less into detail.

Problems relating to the Giant Trees.—A new study of some. C. B. Bradley. (Lippincott's Magazine, 1886, pp. 305-316.)

An interesting discussion of the cause of the restricted occurence of *Sequoia gigantea*, in which the writer concludes that the seeds germinate only when they reach the actual earth, being unable to grow in the humus layer which deeply overspreads the ground beneath the trees. The ease with which gardeners succeed in raising Sequoias from seed in ordinary soil is cited as an argument in favor of this hypothesis. Mention is made of the great abundance of seed produced. Each cone is said to contain from 175 to 200 sound seeds, so that the total annual product of even a single tree must be enormous. Were Mr. Bradley's idea borne out by other observations it would seem that the extinction of these noble trees might easily be prevented and their distribution as easily widely increased.

Prodromus Floræ Adventiciæ Boreali-Americanæ. Th. A. Bruhin. (Verhandel. der K. K. zool. botan. Gesellsch. in Wien (1885), pp. 387-450; also reprinted.)

A preliminary list of adventive, naturalized and cultivated plants of North America, compiled mainly from the writings of Pickering, Wood, Gray and Chapman, with observations of the author in Ohio, Wisconsin, Nebraska, Iowa and Dakota. Among cultivated species only those are admitted which are grown on account of useful qualities or are of wide distribution. It is remarked that the species introduced prior to the occupation of North America by Europeans are mainly of South American or West Indian origin. Those of more recent advent are mostly from Europe and Asia, rarely from Africa or Australia. In all 623 species, belonging to 353 genera are included. The *Gramineæ* are most numerous, 80 species being noted; there are 60 *Compositæ*, 48 *Leguminosæ*, and 39 *Labiatæ*, 34 *Rosaceæ* and 30 *Cruciferæ*. We have no exotic *Ericaceæ*, *Orchideæ* nor *Pteridophyta*. Europe has furnished 420 species, Asia 112, South and Central America and the West Indies 64, Africa 12, and Australia 1. 383 species are claimed to be spontaneous and the the remainder, 240, cultivated. Herr Bruhin's list, while doubtless not quite complete, is of very great interest, and a valuable contribution to the literature of plant distribution.

Scribneria. E. Hackel. (Botan. Gazette, xi., pp. 105, 106; one plate.)

A new genus of *Gramineæ* dedicated to Mr. F. Lamson Scribner of Washington, consisting of a single species, *S. Bolanderi*, Hackel, of California and Oregon, originally described by Dr. Thurber as *Lepturus Bolanderi.*

Thalictrum. Wm. Trelease. (Botan. Gazette, xi., pp. 92-93.

Professor Trelease presents descriptions of *T. purpurascens*, L., and *T. polyganum*, Muhl, (*T. Cornuti* of Gray's Manual), giving the characters whereby he has been able to distinguish the two. He will be grateful for any specimens which will throw additional light on either of these species.

Western South America.—Notes on the Botany of. John Ball. (Journ. Linn. Soc., xxii., pp. 137-168.)

Willoughby Lake, Vermont.—A Trip to. Walter Deane. (Botan. Gazette, xi., pp. 112-116.)

Botanical Notes.

Tiarella cordifolia has more than once been sent to us with somewhat attenuated and dentate or even laciniate petals, leading one to suspect a possible crossing with *Mitella diphylla.*

This is to ask those who meet with this anomaly to notice, where they meet with it, whether it occurs in more than single plants, and whether accompanied by the two plants.

ASA GRAY.

Note on Bahama Grass. It is generally believed in Jamaica that the Bahama Grass—*Cynodon Dactylon*—so common in all parts of the Island, even in the hightest mountains, does not produce perfect seeds. This opinion has lately been demonstrated at the Government Cinchona Plantations as erroneous, for from ripe seed gathered there some time since, a large quantity of well developed seedlings have been raised. The planting of lawns with this grass has for a long time been a serious expense when the stolons or roots of the grass have to be dibbled in, but this can now be dispensed with, for in favorable weather on the plains, a lawn could be covered with this grass from seed in a very short time, and would certainly produce a turf more regular and permanent than that produced by planting tufts at regular intervals.

Sabal umbraculifera, Griseb. This palm is now recognized as being distinct from the Bermuda Palmetto, *Sabal Blackburniana—S. umbraculifera*, Mart., which is beautifully figured and described by W. B. Hemsley, Esq., A.L.S., in the Botany of the Voyage of the Challenger. The principal points of distinction appear to be in the size of the berries, those of *S. Blackburniana* being much larger than those of the Jamaica Palm. Grisebach appears to have adopted Martius' name in error, for the Jamaica species.

J. HART,
Supt. Govt. Cinchona Plantations.

Teratological. I have found in my yard a seedling plantlet of *Acer platanoides* with three cotyledons, and have a plant of *Podophyllum peltatum* which, instead of the usual flower-bud terminating the stem, has a minute erect leaf not peltate, as the normal ones are.

W. W. BAILEY.

Monstrosity in Iris. A new monstrosity observed in the flowers of the genus *Iris* by C. Massalongo. (Nuovo Giornale Botanico Italiano, xviii., pp. 155-156; plate X.) For two successive years a hybrid form has been found which is probably a cross between *Iris squalens* and *I. florentina.* Floral diagrams are given showing dimerous, trimerous, tetramerous and pentamerous flowers, none of them however, entirely regular, as in two cases the petaloid styles are either lacking or unilaterally developed, and in the four and five-parted flowers two of the petals, in each are lacking, and the filaments united irregularly. The author hopes that these studies in teratology will throw light on the floral morphology of this genus, and perhaps, render more manifest its analogy with other families of the monocotyledons.

A Synopsis of the Rhizocarpeæ. In the April number of the Journal of Botany, Mr. J. G. Baker begins a synopsis of all known species of this interesting order of Pteridophytes; thirteen species of *Salvinia* are described, of which three are new to science. Of *Azolla*, five species are recognized, *A. Caroliniana*, Willd., being the only one native to North America.

Researches on the cell-nucleus. Rev. W. H. Dallinger, LL.D., F. R.S. (Journal of the Royal Microscopical Society, vi., pp. 193-207. Plates vii-ix.) This adds another to the list of studies which have been carried on by means of the latest and most improved objectives and patient, long-continued observation. The organisms selected are *Heteromita rostrata*, *Polytoma uvella*, *Tetramitus rostratus*, and *Dallingeria Drysdali*, and of them Dr. Dallinger says:

"I know of no clear reason for concluding that they are either vegetable or animal; they possess in fact some of the characteristics of both, and certainly they represent the lowliest organization of either great line of organic life." The following conclusions were arrived at: "The nucleus is the centre of all the higher activities of these organisms. The spore or germ itself appears but an undeveloped nucleus; and when that nucleus has attained its full dimensions in size, there is a pause in growth in order that its internal development may be accomplished. Moreover it is from it that the flagella originally arise. In the same way it is by a complex and beautiful series of delicate activities in the nucleus that the wonderful act of fission is initiated, and in all probability carried to the end. So too, all the involved changes that go with fertilization and the production of germs are a series of correlated activities due, at the beginning at least, wholly to the nucleus."

A Summer course in botany is announced for the month of July at Cambridge, Mass. Prof. Goodale will give four morning lessons a week at the Botanic Garden on Morphology, based on Vol. I. of Gray's Text-book, and four afternoon lectures on Physiology, following Vol. II. Mr. F. L. Sargent will give instruction in Cryptogamic Botany five times a week.

Cross-fertilization of plants by birds. Fritz Müller. (Kosmos. 1886, i., 93-98.) A brief review is given in Science (Supplement, May 14th, 1886) illustrated by three figures of *Feijoa*, one of the genera of *Myrtaceæ*, and a native of South America. The highly modified petals are sweet and soft, very attractive to birds (Thamnophilus), which in reaching down to pick them off brush away the pollen from the erect stamens, and later dust the pistils of other blossoms with it.

Hibernation of Utricularia vulgaris and U. neglecta. A writer in the Gardener's Chronicle, vol. xxv., p. 556, describes certain phases in the life-history of these plants. He states that after having matured their growth in the autumn the tips of the stems exhibit a thickening which reaches the size of a pea or even a hazel nut. Later the whole plant sinks and dies, except these terminal buds, which now assume the appearance of small dark-colored balls, and, under a low magnifying power, are seen to consist of bulblets made up of the excessively shortened multifid leaves whose slender teeth give the little mass a bristly appearance. and probably protect it in a measure from small aquatic animals. After resting in this condition all winter, growth recommences in the spring, when the axis elongates, the leaves spread out, and the plant soon attains a considerable size. This mode of vegetative reproduction is evidently of great advantage to the Bladderworts, these terminal buds acting as a means of distribution, and the plants reaching a considerable size by their growth long before seeds could be produced.

The Relation between the "Bloom" on Leaves and the Distribution of the Stomata. Dr. Francis Darwin contributes to the Journal of the Linnæan Society, vol. xxii., pp. 99–116, a paper which gives some of the results obtained by his father and himself during an exhaustive study of this subject. It is found that in leaves with no bloom on either surface there is a decided tendency towards the accumulation of stomata in the lower epidermis; in leaves with bloom on the lower surface only, which is thus protected from wetting, the tendency is even stronger in the same direction; in those which have bloom only on the upper surface, there appears to be an accumulation of stomata on this surface, but the few species examined render this somewhat untrustworthy as a general conclusion; leaves having bloom on both surfaces, sometimes have more stomata above than below, and sometimes the reverse is the case.

Proceedings of the Club.

The regular monthly meeting was held at Columbia College Tuesday evening, May 11. Dr. Newberry presided, and twenty-six persons were present. Miss Louise M. Stabler was elected active member and Miss Mary C. Cook corresponding member. Mr. E. E. Sterns distributed the title-page and prospectus of a catalogue of the plants of Manhattan Island, requesting the aid of the members in making it as complete as possible. Professor Schrenk exhibited a pod from a cleistogamous flower of *Viola cucullata*, in which sixty-six seeds had sprouted and the seedlings had attained the height of nearly two inches; when he pulled it up they still remained attached to the pod. He also read a list of thirty-three wild plants in his garden, among them *Dodecatheon Meadia* and *Isopyrum biternatum*. Professor Day read a list of additions to the Flora of Westchester County. Mr. Poggenburg read a list of fifty-seven plants collected on the 23d and 24th of April, and Mrs. Britton reported *Nuphar advea* in bloom on the 25th. She also exhibited an acorn of the white oak with four cotyledons and two radicles. Dr. Britton exhibited a series of specimens of *Populus grandidentata* and *P. heterophylla*, and read some notes on the differences in the leaves and nomenclature. Mr. P. H. Dudley read the paper announced for the evening on the formation of ducts in the chestnut, *Castanea vulgaris*, var. *Americana* DC., comparing them by means of wood sections and photo-micrographs with those of the Hemlock, *Tsuga Canadensis*, Carr., and the Larch, *Larix Americana*, Michx.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XIII.] New York, July, 1886. [No. 7.

Check List of Marine Algæ.

Based on Specimens collected on the shores of Long Island, from 1839 to 1885.

By Nicolas Pike.

ORDER I.—CRYPTOPHYCEÆ.

SUB-ORDER—NOSTOCHINEÆ.

Sphærozyga Carmichaelii, Harv. Fort Hamilton, Greenport, on decayed algæ; summer.

Nodularia Harveyana, Thuret. Bay Ridge and Hell Gate; summer.

Spirulina tenuissima, Kütz. Fort Hamilton pier, Fike-poles, Gravesend Bay; summer.

Beggiatoa alba, Treves. Fort Hamilton, Jamaica Bay; summer.

Oscillaria limosa, Kütz, and

O. subuliformis, Harv. Jamaica Bay, Whitestone.

Microcoleus chthonoplastes, Thuret. Fort Hamilton, Greenport; summer.

Lyngbya majuscula, Harv. Canarsie, College Point; summer.

L. æstuarii, Liebm. Fort Hamilton, Bay Ridge; summer.

L. luteo-fusca, Ag. Coney Island Creek; summer.

L. tenerrima, Thuret. Jamaica Bay, College Point; summer.

L. nigrescens, Harv. Canarsie, Bay Ridge; summer.

Calothrix confervicola, Ag., in fresh and salt water. Bay Ridge and Fort Hamilton; summer.

C. crustacea (Schousb.), Born. and Thuret. Bay Ridge and Fort Hamilton; summer.

C. scopulorum, Ag. Greenport, Little Egg Harbor; summer.

C. pulvinata, Ag. Greenport, Little Egg Harbor; summer.

C. parasitica, Thuret. Greenport, Jamaica Bay; summer.

Rivularia atra, Roth. Hell Gate, Flushing Bay.

R. plicata, Carm. Jamaica Bay, Canarsie.

Isactis plana, Thuret. Fort Hamilion, Jamaica Bay on *Fucus*.

Hormactis Quoyi (Ag.), Born. Greenport; July.

ORDER II.—ZOÖSPOREÆ.

SUB-ORDER.—CHLOROSPOREÆ.

Monostroma pulchrum, Farlow. College Point, Sag Harbor; April.

M. Grevillei, Wittrock. College Point, Sag Harbor; June.

Ulva Lactuca (L.), Le Jolis.*

U. Lactuca, var. *rigida* (Ag.), Le Jolis.*

U. Lactuca, var. *Lactuca*, Le Jolis.*

U. Lactuca, var. *latissima*, Le Jolis.*

U. enteromorpha, Le Jolis.*

U. enteromorpha, var. *lanceolata*, Le Jolis.*

U. enteromorpha, var. *intestinalis*, Le Jolis.*

U. enteromorpha, var. *compressa*, Le Jolis.*

U. clathrata, Ag.*

U. Hopkirkii (McCalla.),* Harv.

(Very common all around the coast).

Ulothrix flacca (Dillw.), Thur. Greenport; summer.*

U. isogona, Thuret. College Point, Rockaway; April.

U. collabens (Ag.), Thur. Greenport; May.

Chætomorpha melagonium (Web. and Mohr), Kütz. Greenport, Rockaway inlet.*

C. ærea (Dillw.), Kütz. Bath, Bay Ridge; summer.

C. Picquotiana (Mont.), Kütz. Fort Hamilton; summer.*

C. Linum (Flor. Dan.), Kütz. Jamaica Bay; summer.*

Rhizoclonium riparium, Roth. Harv. College Point; July.*

B. tortuosum, Kütz. Orient.

Cladophora arcta, Dillw. Fort Hamilton, Bay Ridge, College Point; February to June.

C. lanosa (Roth.), Kütz. Rockaway, Flushing; May and June.

C. lanosa, var. *uncialis*, Thur. Rockaway, Flushing; May and June.

C. rupestris, (L.) Kütz. Canarsie, Bath, College Point.*

C. albida (Huds.), Kütz. Jamaica Bay; very common.*

C. refracta (Roth.), Aresch. Jamaica Bay; very common.

C. glaucescens (Griff.), Harv. College Point, Orient, Greenport; summer.

C. laetevirens (Dillw.), Harv. Fort Hamilton, Gravesend Bay; summer.

C. Hutchinsiæ (Dillw.), Kütz. College Point; very rare; summer.

C. flexuosa (Griff.), Harv. East River, Flushing Bay; summer.

C. Rudolphiana, Ag. Jackson Ferry, Hell Gate; July.

C. gracilis (Griff.), Kütz. Fort Hamilton; April to June.

C. expansa, Kütz, Greenport; summer.*

C. fracta, Kütz. South Ferry; summer.*

Bulbocoleon piliferum, Prings. Greenport; July.*

SUB ORDER.—BRYOPSIDEÆ.

Bryopsis plumosa, (Huds). Ag. Fort Hamilton, Bay Ridge; May to September.

B. hypnoides, Lamx. College Point, Jackson Ferry; May to September.

Family SCYTOSIPHONEÆ.

Phyllitis fascia, Kütz. All round the coast; November to January.

Scytosiphon lomentarius, Ag. All round the coast.*

Family PUNCTARIEÆ.

Punctaria latifolia, Grev. Fort Hamilton, Greenport; June.*

P. latifolia, var. *Zosteræ*, Le Jolis. Fort Hamilton, Greenport; June.*

P. plantaginea, (Roth.) Grev. Orient, Sag Harbor; summer.

Family DESMARESTIEÆ.

Desmarestia aculeata, Lamx. Fort Hamilton, Orient, Greenport; summer.*

D. viridis, Lam. Fort Hamilton; very common; summer.*

Family DICTYOSIPHONEÆ.

Dictyosiphon fœniculaceus, Grev. Greenport, Port Jefferson; spring and summer.

D. hippuroides, Lyngb. College Point, Jamaica Bay.*

Family ECTOCARPEÆ.

Myriotrichia clavæformis, Harv. Greenport, Orient, Montauk Point; summer.

Ectocarpus reptans, Crouan. Greenport, Port Jefferson; summer.*

E. tomentosus (Huds.), Lyngb. College Point; summer.*

E. granulosus, Ag. Sag Harbor; summer.

E. granulosus, var. *tenuis*, Farlow. Sag Harbor; summer.*

E. confervoides, (Roth.) Le Jolis. College Point, Sag Harbor.*

E. confervoides, var. *siliculosus*, Kjellman. College Point, Sag Harbor.*

E. fasciculatus, Harv. Hell Gate, Orient, Quogue; summer.*

E. lutosus, Harv. Great South Bay, Fort Hamilton; summer.*

E. littoralis, Lyngb. All round the coast.

E. littoralis, var. *robustus*, Farlow. All round the coast.*

E. brachiatus, Harv. College Point, Jamaica Bay; summer.*

E. Hooperi, Harv. Greenport; summer.*

E. Dietziæ, Harv. Greenport; summer.*

Family SPHACELARIEÆ.

Sphacelaria cirrhosa (Roth.), Ag. Greenport; October.*

S. radicans (Dillw.), Harv. College Point; November.*

Cladostephus verticillatus, Ag. Orient, Oyster Bay; September and October.*

Family MYRIONEMEÆ.

Myrionema vulgare, Thur. Common parasite on other algæ.

Family LEATHESIÆ.

Elachistea fucicola, Fries. Common, growing on Fuci; summer.*

Myriactis pulvinata, Kütz. Greenport, Southampton, Orient; growing on other algæ; summer.*

Leathesia difformis (L.), Aresch. Parasite; Greenport, Fort Hamilton, Orient; summer.*

Family CHORDARIEÆ.

Chordaria flagelliformis, Ag. Greenport, Sag Harbor, Orient; summer.*

Mesogloia divaricata, Kütz. Jamaica Bay, Great South Bay; August and September.*

M. vermicularis, Ag. Greenport; rare; summer.*

Castagnea virescens (Carm.), Thur. Whitestone, Orient; May.*

C. Zostereæ, (Mohr.) Thur. Whitestone, Orient; May.*

Family SPOROCHNEÆ.

Stilophora rhizodes, Ag. Greenport, Peconic Bay, Fort Hamilton, Orient; July to November; in fruit October.

Arthrocladia villosa, Duby. Greenport; rare.*

Striaria attenuata, Grev. Flushing Bay, Hell Gate, Fort Hamilton; summer.

Family LAMINARIEÆ.

Chorda filum, L. Whitestone, Peconic Bay, Orient; August and September.

Laminaria saccharina (L.), Lamx. Rockaway Beach, Montauk Point.

L. digitata (Turn.), Lamx. Greenport, Orient.

Alaria esculenta, Grev. Greenport, Orient, Peconic Bay.

ORDER III.—OOSPOREÆ.

SUB-ORDER.—FUCACEÆ.

Ascophyllum nodosum, Le Jolis. Common round the coast.

Fucus vesiculosus, L. Common.

F. ceranoides, L. Fort Hamilton, Orient.

Sargassum vulgare, Ag. Bath, Freeport, College Point.*

S. vulgare, var. *Montagnei*, Farlow. Fort Hamilton, Greenport.*

S. bacciferum, Ag. Rockaway Beach.

SUB-ORDER.—VAUCHERIEÆ.

Vaucheria Thuretii, Woronin. All round the coast in ditches.

V. litorea, Nordstedt. All round the coast in ditches.

ORDER IV.—FLORIDEÆ.

Trentepohlia virgatula (Harv.), Farlow. College Point; summer.*

T. virgatula, var. *secundata*, Farlow. College Point; summer.*

SUB-ORDER.—PORPHYREÆ.

Porphyra laciniata, Ag. All round the coast; summer.*

Bangia fusco purpurea, Lyngb. Fort Hamilton, Flushing Bay, Greenport; summer.*

SUB-ORDER.—SQUAMARIEÆ.

Peyssonnelia Dubyi, Crouan. Greenport, Peconic Bay.

Hildenbrandtia rosea, Kütz. Common, in patches on stones.

SUB-ORDER.—NEMALIEÆ.

Nemalion multifidum, Ag. Sag Harbor, Greenport; August and September.*

Scinaia furcellata, Bivona. College Point, Greenport; summer.*

SUB-ORDER.—SPERMOTHAMNIEÆ.

Spermothamnion Turneri, Aresch. Bath, Jamaica Bay, Fort Hamilton; summer.

SUB-ORDER.—CERAMIEÆ.

Callithamnion Rothii, Lyngb. Fort Hamilton; probably spring.*

C. cruciatum, Ag. Red Hook, Bay Ridge, Fort Hamilton; September and October.

C. floccosum, Ag. Greenport, Orient.

C. Pylaisæi, Mont. Peconic Bay, Sag Harbor, Quogue.

C. Americanum, Harv. Bath, Shinnecock Bay, College Point; June.*

C. plumula, Lyngb. Fort Hamilton, College Point; September to October.*

C. Borreri, Ag. Fort Hamilton, Bay Ridge.*

C. roseum (Roth.), Harv. Jamaica, Bay, Fort Hamilton.*

C. polyspermum, Ag. Bath, Hempstead Bay.*

C. tetragonum, Ag. Fort Hamilton.*

C. Baileyi, Harv. Fort Hamilton; August to November.

C. Baileyi, var. *laxa*, Farlow. Fort Hamilton, on *Zostera*, shells and stones.

C. byssoideum, Arn. Greenport, Fort Hamilton; October and November.*

C. corymbosum, Lyngb. Bath, Orient, Greenport; October and November.

C. corymbosum. var. *secundatum*, Harv. Bath, Orient, Greenport, on *Zostera*, etc.

C. Dietziæ, Hooper. Greenport.*

C. scirospermum, Griff. College Point.*

C. tenue, Harv. Fort Hamilton, Jamaica Bay.

Griffithsia Bornetiana, Farlow. Sag Harbor, Hell Gate; June and July.*

Halurus equisetifolius, Kütz. Greenport, Great South Bay. *

Ptilota elegans, Bonnem. Coney Island, Fort Hamilton; September and October.*

P. serrata, Kütz. Bath, Greenport; September and October.*

Ceramium rubrum, Ag. Common round the coast; June and July.*

C. rubrum, var. *proliferum*, Ag. June and July. *

C. rubrum, var. *secundatum*, Ag. Common; June and July.*

C. rubrum, var. *squarrosum*, Harv. June and July.*

C. circinnatum, Kütz. Glen Cove; August and September.*

C. diaphanum, Roth.

C. strictum (Kütz.), Harv. Jamaica Bay; August and Sept.

C. Hooperi, Harv. Greenport.*

C. fastigiatum, Harv. Rockaway, Jamaica Bay; June and July.*

C. tenuissimum (Lyngb.), Ag. Sag Harbor, Glen Cove; July and August.*

C. tenuissimum, var. *arachnoideum*, Ag. July and August.*

C. tenuissimum, var. *patentissimum*, Harv. On *Zostera* and algæ; July and August.

C. Capri-Cornu (Reinsch.), Farlow. Canarsie.*

SUB-ORDER.—SPYRIDIEÆ.

Spyridia filamentosa, Harv. Sag Harbor, Glen Cove, Fort Hamilton; August and September.

SUB-ORDER.—GIGARTINEÆ.

Phyllophora Brodiæi, Ag. Glen Cove, Hell Gate, Orient; September and October.*

P. membranifolia, Ag. Hell Gate, Fort Hamilton, Greenport; September to November.

Gymnogongrus Norvegicus, J. Ag. Rare, dredged off the Narrows.*

G. Torreyi, Ag. Common, Fort Hamilton, Glen Cove; November to January.*

Ahnfeldtia plicata, Fries. Fort Hamilton, Port Jefferson; August and September.

A. plicata, var. *fastigiata*, Farlow. Greenport, College Point.

Cystoclonium purpurascens, Kütz. Common round the coast; August to November.*

C. purpurascens, var. *cirrhosa*, Farlow. Common round the coast; August to November.*

Gigartina mamillosa, Ag. Greenport, Montauk Point; August and September.*

Chondrus crispus (L.), Stack. Port Jefferson, Glen Cove, College Point; August to November.*

SUB-ORDER.—RHODYMENIEÆ.

Rhodymenia palmata (L.), Grev. Orient, Montauk Point, Greenport; September and October.*

R. palmata, var. *Sarniensis*, Farlow. Montauk Point, Greenport; September and October.*

Euthora cristata, J. Ag. Montauk, Orient, Greenport; September.*

Lomentaria uncinata, Menegh. College Point, Glen Cove; September and October.*

L. uncinata, var. *filiformis*, Harv.

L. rosea (Harv.), Thur. Montauk, Orient, Port Jefferson.

Champia parvula, Ag. Bay Ridge, Canarsie, Jamaica Bay.

SUB-ORDER.—HYPNEÆ.

Hypnea musciformis, Lamx. Greenport, Flushing Bay.

SUB-ORDER.—GELIDIEÆ.

Gelidium crinale, J. Ag. Common from Fort Hamilton to Greenport; December and January.*

SUB-ORDER.—SOLIERIEÆ.

Rhabdonia tenera, Ag. Common round the coast; August to November.

SUB-ORDER.—SPONGIOCARPEÆ.

Polyides rotundus, Grev. Sag Harbor, Montauk, Port Jefferson; April and May.*

SUB-ORDER.—SPHAEROCOCCOIDEÆ.

Grinnellia Americana, Harv. Very common, Fort Hamilton and Gravesend; July to November.*

Delleseria sinuosa, Lamx. Montauk Point, Greenport; September to December.*

D. alata, Lamx. Montauk Point.

D. Leprieurii, Mont. Flushing Bay, Glen Cove; summer.*

Gracilaria multipartita, J. Ag. Glen Cove, Port Jefferson; November to January.*

G. multipartita, var. *angustissima*, Harv. Pond Quogue; November.*

SUB-ORDER.—RHODOMELEÆ.

Chondriopsis dasyphila, Ag. Southampton; June and July.*

C. dasyphila, var. *sedifolia*, Ag. Ammaganset Beach.

C. tenuissima, Ag. Glen Cove, Greenport, Orient; June.*

C. tenuissima, var. *Baileyana*, Farlow. Glen Cove, Greenport, Orient; July.*

C. littoralis (Harv.), J. Ag. Fort Hamilton, Cow Bay.*

C. atropurpurea (Harv.), J. Ag. Jamaica Bay, Glen Cove.*

C. atropurpurea, var. *fasciculata*, Farlow. Fort Hamilton.*

Rhodomela subfusca, Ag. April and May.

R. subfusca, var. *gracilior*, J. Ag. Common in Spring at Bay Ridge, Fort Hamilton, College Point, Glen Cove; April and May.

Polysiphonia urceolata (Dillw.), Grev. Shinnecock Bay, Bay Ridge; May and June.*

P. urceolata, var. *formosa*, Ag. Fort Hamilton; May and June.*

P. urceolata, var. *patens*, Grev. Fort Hamilton; May and June.*

P. subtilissima, Mont. Jamaica Bay.

P. subtilissima, var. *Westpointensis*, Harv. Jamaica Bay.

P. Olneyi, Harv. Canarsie.

P. Harveyi, Bail. Fireplace Bay, Greenport.

P. elongata, Grev. Peconic Bay, Glen Cove; October and November.

P. fibrillosa, Grev. Jamaica Bay, Fort Hamilton.

P. violacea, Grev. Greenport, Montauk; July.

P. violacea, var. *flexicaulis*, Harv. Greenport, Montauk.

P. variegata, Ag. Common round the coast.

P. parasitica, Grev. Fort Hamilton, East River.

P. atrorubescens, Grev. East River, Hell Gate.

P. nigrescens, Grev. Common; May and June.

P. nigrescens, var. *fucoides*, Ag. Fort Hamilton, Bay Ridge.

P. nigrescens, var. *affinis*, Ag. Fort Hamilton, Bay Ridge.

P. fastigiata, Grev. Glen Cove, Montauk Point; July and August.

Bostrychia rivularis , Harv. Flushing Bay, Whitestone.

Dasya elegans, Ag. Common; July to November.

Corallina officinalis, L. Common.

Melobesia farinosa, Lamx. Glen Cove, Greenport.

M. pustulata, Lamx. Flushing Bay, Rockaway.

M. macrocarpa, Rosanoff. Orient, Canarsie, Quogue.

M. Lenormandi, Aresch. Fort Hamilton College Point.,

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* Those marked with an asterisk were found in fruit at the time specified.

The Flora of Ross County, Ohio,

COMPARED WITH THAT OF NEW ENGLAND.

Read June 8th.

W. E. SAFFORD.

In Southern Ohio the first of the spring flowers is the "pepper-and-salt", or "harbinger of spring", *Erigenia bulbosa*, Nutt., a tiny Umbelifer. I have found it as early as the last week in February, although it does not usually appear until a month later. It grows in shady woods, where it is usually found nestling between the forking roots of beeches, associated with *Isopyrum biternatum*, T. and Gr. The latter is a beautiful little plant closely resembling *Thalictrum anemonoides*, but with fibrous instead of tuberous roots. In the region through which I botanized nearly every specimen of *Thalictrum anemonoides* had pink-tinted sepals.

Of the two species of *Hepatica* which occur in Southern Ohio, *Hepatica acutiloba*, DC., is much more common. I have found many specimens which seem to be intermediate between the two species. Many other spring plants occur which are familiar to New England botanists, such as: *Dicentra Canadensis*, DC., and *D. Cucullaria*, DC.; *Dentaria laciniata*, Muhl.; *Sanguinaria Canadensis*, L., and *Podophyllum peltatum*, L. *Anemone nemorosa*, L., does not occur. I have never found *Dentaria diphylla*, L.; but it has been recorded as growing in the vicinity of Cincinnati.

Trillium grandiflorum, Salisb., is common. Associated with it are two Trilliums not found in New England: *Trillium sessile*, L., a small species with spotted leaves and sessile flowers of the same dark color as the typical form of *Trillium erectum*, L., and *Trillium nivale*, Riddell, a dwarf, with a peduncled white flower and petioled leaves.

Other species not met with in New England are *Erythronium albidum*, Nutt., a very pretty plant, flowering before *E. Americanum*, Smith; *Stylophorum diphyllum*, Nutt., a bright showy poppy growing in the woods, resembling *Chelidonium majus*, L.; *Hydrastis Canadensis*, the "orange-root", similar in its manner of growth to *Podophyllum peltatum; Uvularia grandiflora*, Smith, bearing large bright yellow flowers; *Jeffersonia diphylla*, Pers., the "twin-leaf", looking to a casual observer like a Sanguinaria; and *Camassia Fraseri*, Torr., the pale blue "wild hyacinth".

Polemonium reptans, L., grows abundantly in the woods, associated with *Delphinium tricorne*, Mich., and *Mertensia Virginica*, DC.. a richly colored member of the Borraginaceæ. *Hydrophyllum Virginicum*, L., *H. macrophyllum*, Nutt., and *H. appendiculatum*, Mich,, occur. The last takes its name from the peculiar reflexed appendages between the parts of the calyx. *Valeriana pauciflora*, Mich., with pink flowers like miniature honey-suckles, is common in the deep woods. Its specific name is misleading, as it is not by any means few-flowered.

During the last week of May and the first week of June the hills are bright with patches of the crimson "fire pink", *Silene Virginica*, L., associated with the pale lavender pink, *Phlox divaricata*, L., with which it forms a most pleasing contrast of colors.

In the summer months the open fields are covered with *Vernonia fasciculata*, Mich., a species closely resembling *V. Noveboracensis*, Willd., but having its involucre composed of blunt instead of awn-tipped scales. Another common plant in the fields which does not extend to New England is the beautiful *Eupatorium* (or *Conoclinium*) *cœlestinum*, L.

Clematis viorna, L, the "leather flower", is very common. It often grows in thickets associated with the common *Menispermum, Smilax glanca*, Walt., *Smilax tamnoides*, L., and the delicate little passion flower, *Passiflora lutea*, L., a beautiful plant climbing among the blackberry and papaw bushes, by means of tendrils, and bearing axillary clusters of miniature green "passion flowers".

The banks of many of the streams are hedged with *Hydrangea arborescens*, L., associated with *Staphylea trifolia*, L., *Carpinus Americana*, Michx., *Lindera Benzoin*, Meisner, the red maple and the slippery elm. *Cornus florida* and *Viburnum acerifolium* are common.

In the month of July the woods are bright with the orange-red flowers of the trumpet creeper (*Tecoma radicans*), which climbs to the tops of the highest trees. There are also a number of quite pretty Labiates to be collected, among which are *Scutellaria versicolor*, Nutt.; *Scutellaria canescens*, Nutt.; *Blephila hirsuta*, Benth.; and *Monarda fistulosa*, L.

Impatiens fulva, Nutt., and *Impatiens pallida*, Nutt., are equally common. *Campanula Americana*, L., grows as a rank weed, associated with *Agrimonia Eupatoria*, L.; *Silene stellata*, Ait., and *Eupatorium purpureum*, L.

Many of the common weeds growing in hedges and along the roadsides are not found in New England. *Actinomeris squarrosa*, Nutt., is a coarse yellow Composite, somewhat like a *Helianthus* in general appearance, but easily determined by the decurrent leaves which form broad green wings along the stem.

Dysodia chrysanthemoides, Lag , the "fetid marigold", and *Cunila Mariana*, L., are also weeds not found in New England. The *Peloria* state, or five-spurred form, of the common *Linaria vulgaris*, Mill., occurs very frequently in waste places. The garden chamomile, *Anthemis nobilis*, L., has established itself in several spots, growing among the Mayweed, *Maruta Cotula*, DC., a plant which it very closely resembles, but from which it may easily be distinguished by its pleasant odor.

Many of the New England asters and golden rods occur, and with them a number of western and southern species. *Solidago rupestris*, *Solidago Shortii*, Torr. and Gray, and *Aster Shortii*, Boott., are all very pretty species. The last has beautiful light purple ray flowers and lemon-colored discs. The heads form numerous luxuriant panicles, frequently growing four or five feet high.

Along the banks of the creeks and rivers another beautiful Composite grows, *Silphium perfoliatum*, L. It is associated with

Rudbeckia triloba, L., a very pretty deep yellow species, much more delicate than the *R. hirta*, which has found its way to New England.

Growing in the water of the creeks are masses of *Rhytoglossa pedunculosa*, Nees. (*Dianthera Americana*, L.), one of the Acanthaceæ.

On the gravelly shores *Polanisia graveolens*, Raf., is a common weed. It is usually associated with the "fog fruit", *Lippia lanceolata*, Michx., a low procumbent member of the Verbenaceæ, bearing compact round heads of bluish-white flowers.

Climbing in the hedges and associated with *Smilax glauca*, Walt., and *Smilax tamnoides*, L., I found *Enslenia albida*, an Asclepiad, with small whitish flowers and heart-shaped leaves, which resemble at first glance those of a climbing *Polygonum*. Another common hedge-plant is the bind-weed, *Convolvulus sepium*, R. Br. In the fence corners I found an interesting plant which proved to be *Seymeria macrophylla*, Nutt., the "mullein fox-glove".

Most of the trees in this region also occur in New England. The woods are composed of oaks, beeches, maples, hickories, *Negundo aceroides*, *Liriodendron tulipifera*, *Juglans cinerea*, L., and *Juglans nigra*, L. Four Leguminaceous trees are indigenous, which occur in New England only as introduced or naturalized species: *Robinia pseudacacia*, L.; *Gymnocladus Canadensis*, the "Kentucky coffee tree"; *Gleditschia triacanthos*, L., and *Cercis Canadensis*, L.

Among the oaks the most interesting is *Quercus macrocarpa*, Michx., in which the cup of the acorn is imbricated with pointed scales, and is bordered by a mossy margin nearly enclosing the acorn.

The rivers and creeks are lined with tall sycamores, white willows and cotton-woods, *Populus monilifera*, Ait.

All of the ferns are included in the New England flora; but some of the species most common in New England, such as *Pteris aquilina* and *Polypodium vulgare*, I found to be very rare in Ross County. *Aspidium Goldieanum*, Hook., *Asplenium angustifolium*, Michx., and *Camptosorus rhizophyllus*, Link., were quite common in ravines and on shaded rocky hillsides.

New Grasses.

BY DR. GEO. VASEY.

TRISETUM MONTANUM.—Culms 1 ½ to 2 ½ feet high, smooth, rather slender; cauline leaves 6 to 10 inches long, the upper sometimes equaling the panicle, somewhat scabrous, the lower sheaths pubescent, ligule about 1 line long, blunt; panicle 4 to 6 inches long, loose and open but not spreading, rays in clusters of three to five, unequal, ½ to 1 ½ inches long, suberect, minutely scabrous, flowering nearly to the base, the longer rays with five to seven appressed branchlets; spikelets about 2 ½ lines long, two-flowered and with a minute hairy pedicel; outer glumes unequal, acute, scarious margined, smooth, except on the keel, the lower narrow, about 1 line long, the upper one-half longer, broadly lanceolate; flowering glumes about 2 lines long, narrowly lanceolate, acuminate and terminating in two short, fine setae, obscurely five-nerved, minutely scabrous, with short hairs at the base and on the rhachilla, the awn from about the upper third, diverging, rather longer than its glume; palet narrow, little shorter than its glume, bidentate; ovary not hairy at the apex.

This must include what I published in Wheeler's Report, Vol. VI., as *T. alpestre, Beaur.*, which has short leaves, and a very different panicle and flowers. It has been mistaken for an open panicled form of *T. subspicatum.*

DIPLACHNE REVERCHONI.—Culms cæspitose, erect, filiform, simple, 4 to 10 inches high; leaves mostly radical, numerous, setaceous, smooth, 1 to 2 inches long, only one or two on the culm near the base; raceme simple spike-like, 2 to 3 inches long; spikelets sessile, appressed and mostly imbricate, alternate or somewhat one-sided, 3 to 4 lines long, seven to nine-flowered; empty glumes lanceolate, obtusish, compressed, one-nerved, the upper about 1 line long, the lower ⅓ shorter; flowering glumes ovate-lanceolate, acutish, three-nerved, smooth, except a slight pubescence at the base and on the rhachis, bilobed at the apex, and with a short awn a little exceeding its glume; palet little shorter than its glume, somewhat stalked at the base.

Collected on granitic rocks, Llano Co., Texas, by Mr. J. Reverchon.

GLYCERIA LEMMONI.—In the Botanical Gazette for January, 1878, I published this species as *Poa Lemmoni*. It must now fall into *Glyceria*, section *Atropis*, and hence the above name. It is a very distinct species and has since been collected by Mr. M. E. Jones in Nevada, and in Oregon by Mr. T. Howell.

FESTUCA TEXANA.—Culms 2 to 2½ feet high, rather stout, smooth; leaves rather numerous below with loose sheaths, only two or three above with long smooth sheaths, and linear-acuminate erect blades, 4 to 8 inches long, and 1 to 2 lines wide; ligule wanting; panicle pyramidal, about 6 inches long, the branches erect-spreading, in pairs below, single above, somewhat distant, the lower ones 3 to 4 inches long, divided above the middle, few-flowered, pedicels nearly as long as the spikelets to twice as long; spikelets light green and glaucous, three to five-flowered, about 4 lines long; empty glumes linear-lanceolate, acute, rigid, smooth except on the midrib, the lower one nearly 2 lines long, one-nerved, the upper one ⅓ longer, three-nerved; flowering glumes ovate-lanceolate, acute, mucronate or short-awned, smooth, rigid, about 3 lines long, indistinctly five-nerved, finely punctulate; palet equaling its glume and as firm in texture, terminating with two fine teeth.

ELYMUS MACOUNII.—Several years ago I received from Mr. J. Macoun an *Elymus* collected in the Great Plains of British America which I called by the above name, but no account of it was published. I have several times since received it from within the limits of the United States, and two years ago myself collected it freely in the mountains of Colorado. The specimens from different localities show considerable variation, but I am not able to separate them specifically. It is the smallest of our species, and in reduced forms has much the appearance of *Hordeum pratense*. It may be described as follows:

Culms 2 to 3 feet high, smooth, leaves of culm 3 or 4, rigid, erect, narrow, scabrous, 3 to 6 inches long; ligule short and truncate; spike slender, erect, cylindrical, 3 to 5 inches long; commonly in slender specimens there is but

1 spikelet at each joint of the rhachis, in stronger ones the lower spikelets are in pairs and the upper ones single; frequently some of the spikelets have three glumes, even some of the double ones, i. e., one glume on each side and one in front. Spikelets one to three-flowered, empty glumes linear-lanceolate, rigid, scabrous, mostly three-nerved, 3 to 4 lines long, and running into an awn as long or longer; flowering glumes oblong-lanceolate, punctulate below and scabrous above, 4 or 5 lines long. with an awn as long or longer, five-nerved; palet equaling the glume, obtuse.

ELYMUS NITIDUS.—Culms 2½ to 3 feet high, rather stout and leafy, sterile shoots half as long; leaves erect rigid, scabrous, 6 to 8 inches long, 2 to 3 lines wide, slender pointed; ligule nearly obsolete; sheaths scabrous; spike about 4 inches long, erect; spikelets 1 or 2 at each joint, three to five-flowered; empty glumes 6 to 7 lines long including the awn, the upper one five-nerved, lower one three to four-nerved, scabrous on the nerves; flowering glume about 5 lines long with a fine scabrous awn of equal length, obscurely five-nerved, smooth or nearly so, punctulate and shining; palet a little shorter, ciliate-scabrous on the nerves.

The spike is less thick than in *E. Virginicus*, and more compact than in *E. striatus*. Collected by Mr. W. C. Cusick on the Eagle Mountains in Oregon. Grows in dense tufts, 1 to 2 feet across.

A New Moss from Oregon.

The following description of a new species of Orthotrichum was furnished by Dr. Carl Müller, made from specimens sent to him by Eugene A. Rau:

ORTHOTRICHUM (Euorthotrichum) PRINGLEI, C. Müll, n. sp. Dioicum, caespites elati triunciales laxi flavi; caulis flexuosus irregulariter dichotome divisus gracilescens flaccidus laxifolius; folia caulina elongata horride imbricata madiore valde flexilia patentissima vel recurvata, e basi brevi angustiuscula semiamplexante margine revoluta in laminam elongatam lanceolato-acuminatam carinatam margine erectam ob papillas crenulatam apice subulato acutatam hyalinam protracta, e cellulis minutis rotundatis flavis scabro-papillosis basi folii elongatis densis glabriusculis magis aurantiacis areolata; perich. similia; omnia nervo crasso callosso in acumine evanido; theca breviter exserta e basi brevi urniformi-oblonga octies plicata fusca tenuis, operculo e basi cupulata recte aciculari; calyptra pilis elongatis strictis reticulatis apice simplicibus subulatis glabris hirtissima; peristomii externi dentes ad cap ulam reflexi albidi 16 per paria aggregati lanceolati breviter subulati linea longitudinali tenui exarati obscuri, interni 8 robusti latiusculi linea longitudinali exarati latere sinuoso-crenati obscuri crassi.

Patria, Oregon, Winchester Bay, et Coos River, ad arbores in societate *Neckera Douglasii*, Hook., October, 1881, c. fruct. evacuatis: C. G. Pringle, in herb. E. A. Rau.

Ex habitu ad congeneres *Orthotheræ*, *Syrrhopodontium* c. gr. ad *O. lycopodioidem* accedens. Species distinctissima pulcherrima excelsa.

Pinus pungens in New Jersey.

On the 15th of May, Rev. R. E. Schuh and myself found *Pinus pungens*, Michx., one mile east of Sergeantsville, Delaware Township, Hunterdon County. About one acre is densely covered with it, and an equal area with scattering trees. The location is a warm, sunny one, on a south slope, protected from the north and west winds by surrounding woods.

On inquiry I learn that nearly a half century since the site now occupied by it was a cultivated field, in the middle of which a small pine was for some reason allowed to grow. Subsequently, however, the ground being no longer tilled, there grew up a dense undergrowth, among which was a large number of small pines. These grew so luxuriantly as to choke out the other vegetation. The parent tree still stands larger than any of its offspring, measuring 30 inches in diameter near the ground, and attaining a height of 40 feet.

Whence came this tree? It cannot be traced to cultivation. In fact I am told that repeated trials have been made to transplant the younger trees for ornamental purposes, but with uniformly poor results. The other species of *Pinus* growing in this section are *Pinus rigida*, Muller, *P. inops.*, Art., *P. Strobus*, L. I think it probable that the seed has been carried here, on snow crusts, perhaps, by the wind and, finding a favorable nidus, has sprung up.

Pinus pungens has a varying appearance depending on density of growth. Where the trees grow thickly they are tall, straight, and slender, having but few living branches, except near the top. Quite the contrary when they grow far apart. The trees then present a straggling look, drooping branches loaded with cones, running out 15 feet or more, the extremities of the lower ones often touching the ground.

The cones are quite distinctive. They are ovate-conical, fascicled around the branches in clusters of three to seven, 3½ to 4 inches long, armed with stout spines, which are, from the middle of the cone upward, *incurved*, and from the middle downward, *recurved*. The leaves are stout, 2 to 3 inches long, sometimes shorter, with short sheaths on mature foliage. The sheaths, however, on young leaves about ½ inch long. G. N. BEST.

ROSEMONT, N. J., June 14th, 1886.

Notes on Starch in the Chestnut Wood.

I wish to add a note to my communication of last month in regard to the starch grains in chestnut wood.

June 1st I cut a branch from a tree on the Boston and Albany Railroad, near the Massachusetts and New York State line, at an elevation of 950 feet above the sea. The aments of the chestnut trees then were just appearing; the leaves gave to the trees a dense foliage.

Only a few of the upright starch-carrying cells in the fifth and sixth rings from the bark still contained starch grains. The medullary rays in the alburnum and in the bark did not give a trace, nor were any found in any of the cells of the bark. In chestnut trees at less elevations probably this change had taken place before this date, as the aments on the trees in the eastern portion of the State were much further advanced. The only timber of chestnut generally seen now in Massachusetts is of second growth, and along the line of the railroad mentioned I did not see any above 1,000 feet of elevation.

So little is known in regard to the periods when different trees store starch and then transform it, that I trust many other observers in different sections of the country will give the result of investigations in this respect. It is a matter not only of great scientific interest, but of great practical importance in regard to the cutting of timber.

When the starch is naturally transforming, or is transformed, it is a good media in most woods, if exposed, for the growth of various ferments and moulds—in short, fungi, which hasten the decay of the sap-wood at least. P. H. DUDLEY.

Index to Recent American Botanical Literature.

Agave Americana. (Gard. Month., xxviii, p. 171.)

We are informed that a century plant is about coming into flower in the garden of Mr. George Casey, at Auburn, N. Y.

Algo-Lichen Hypothesis.—A Résumé of the. F. H. Knowlton. (Amer. Month. Micros. Journ., vii., pp. 101–105.)

In a paper read before the Biological Society of Washington, Mr. Knowlton discusses the hypothesis of the compound nature of lichens advanced by Schwendener in 1868, and since elaborated by other botanists, and concludes with Rev. J. M. Crombie that the evidence thus far adduced is insufficient to warrant its acceptance.

Arctostaphylos—Notes on the United States Pacific Coast Species. C. C. Parry. (Proc. Davenport Acad. Nat. Sci., iv., pp. 31–37.)

Arctic Algæ—Notes on; based principally on collections made at Ungava Bay by L. M. Turner, in 1884. W. G. Farlow. (Proc. Amer. Acad. Arts and Sci., xxi., pp. 470, 471.)

The collections contain a number of Florideæ which are seldom seen in herbaria. 150 specimens of *Delesseria* were collected which tend to show that *D. corymbosa* and *D. Bærii* are bnt one species.

Chorizanthe.—A Revision of the Genus. C. C. Parry. (Proc. Davenport Acad. Nat. Sci., iv., pp. 45–65.)

Conifers.—Contributions to the History of Certain Species of. Maxwell T. Masters. (Journ. Linn. Soc., xxii., pp. 169-212, plates II-X and woodcuts.)

Those who are specially interested in this group will find much to attract them in this article, illustrated as it is on almost every page by drawings made from the living plant, either native or cultivated. The species from the U. S. described and figured are *Abies amabilis*, Forbes, *A. grandis*, Lindl., *A. concolor*, Lindl., *A. subalpina*, Englm., *A. nobilis* and *A. magnifica*, with varieties.

Contributions to American Botany, XIII. Sereno Watson. (Proc. Amer. Acad. Arts and Sci., xxi., pp. 414-468.)

This latest of Mr. Watson's contributions is made up of (1st.) A List of Plants collected by Dr. Edward Palmer, in Southwestern Chihuahua, Mexico, in 1885. This collection comprises between five and six hundred numbers and has furnished many new species; the Gamopetalæ were named by Dr. Gray, the Gramineæ by Dr. Vasey, and the Cryptogams by Professor Eaton. (2d.) Descriptions of New Species of Plants, chiefly from the Pacific States and Chihuahua, in which 37 undescribed plants are characterized. (3d.) Notes upon Plants collected in the Department of Ysabal, Guatemala, February to April, 1885; and (4th.) Notes upon some Palms of Guatemala.

Coreopsis.—Annual Species of. (Garden, xxix., pp. 498, 499, with plate.)

Coreopsis cardaminefolia, *C. Drummondii*, *C. aurea*, *C. Atkinsoniana*, and *C. aristosa*, are figured and directions are given for growing these and other species in gardens.

Desmidieæ.—Key to the. A. C. Stokes. (Amer. Month. Micros. Journ., vii., pp. 109-114.)

An artificial classification of North American Desmids, including both genera and species, with references to the pages of Mr. Wolle's "Desmids of the United States."

Diatoms.

Mr. E. A. Congdon reported to the Natural Science Association of Staten Island a list of twenty-two fossil diatoms discovered near Clove Lake. All but three have also been found living in the neighboring ponds. These are *Stephanodiscus Niagaræ*, *Biblarium rhombus* and *Actinoptychus annulatus*.

Flora of Iowa.—Contributions to the. J. C. Arthur. (Proc. Davenport Acad. Nat. Sci., iv., pp. 27-30 and 64-75.)

Flora of the Yellowstone National Park. Frank Tweedy. (Pamphlet, 8vo, 78 pp., Washington, 1886; published by the author.)

A catalogue of plants hitherto found in the Yellowstone Park, with their distribution and habitat, and localities of those less commonly met with. The work is mainly the result of Mr. Tweedy's explorations of the region in 1884 and 1885, when he obtained 605 species. Additional information has been derived from published accounts of collections made by Robert Adams, Professor Coulter, Dr. Parry and Dr. W. H. Forwood. The topographic features of the Park, its forests, the alpine flora, the flora of bogs, ponds and streams, the plants found about the Hot Springs and Geysers, and the grasses are discussed, and much interesting information is presented. In all, 657 species are enumerated. The area of the Park is about 3,350 square miles.

Gentiana Bigelovii. Gray. (Curtis' Botanical Magazine, xlii., tab. 6,874.)

Beautiful figures of this plant are given with quotations from Dr. Gray's description in the Synoptical Flora. The plants from which the drawings were made grew from seeds sent by Dr. Parry, and flowered in August in the rock-garden, being perfectly hardy.

Harvard's Botanic Garden and its Botanists. Ernest Ingersoll. (The Century Magazine, xxxii., pp. 237-248.)

An interesting account of this famous garden and of Dr. Gray's Herbarium. The garden was founded in 1805 under the direction of William Dandridge Peck, the first Professor of Natural History. For ten years after 1822 it was under the charge of Thomas Nuttall, and subsequently was cared for by William Carter. Dr. Gray's connection with it began in 1842. His library and herbarium were presented to Harvard College in 1862, and were placed in the fireproof building they now occupy two years later. Since 1874 all the instruction in botany has been given by Professors Goodale and Farlow and their assistants. The herbarium is now said to number more than 300,000 specimens.

Hypocreaceæ.—Synopsis of the North American. Continued. (Journ. Mycol., ii., pp. 61 69.)

Lilium pardalinum. (Garden, xxix., pp. 524, 525, two woodcuts and a colored plate.)

Montreal Botanic Garden. D. P. Penhallow. (First Annual Report, 1885.)

The site "where the earliest spring flowers bloom" has been selected on Mt. Royal, and some progress has been made in planting. A government appropriation and several private donations have enabled the work to proceed in a quite encouraging manner.

New Plants from Southern and Lower California. C. C. Parry. (Proc. Davenport Acad. Nat. Sci., iv., pp. 38-40.)

Phacelia suffrutescens, *Ptelea aptera*, *Polygala Fishiæ* and *Gilia Orcuttii* are here described.

Opium Mould—A yellow. (*Eurotium aspergillus-glaucus*, Lk.) Wm. Trelease. (Contrib. Dep. Pharmacy Univ. Wisc., ii., pp. 5-9; illustrated.)

It was found on cutting open a cake of Turkey opium. With the naked eye the mycelium and perithecia could be distinguished, as they differ in color. Other spores were also distinguished but could not be identified.

Oxalis acetosella. (Gardener's Chronicle, xxv., pp. 684, 685, with figure.)

The question is again raised whether this or *Trifolium repens* be the true shamrock.

Phosphorescent Fungi. J. B. Everhart. (Journ. Mycol., ii., pp. 70-71.)

Note is made of *Panus stypticus* having been noted by two observers to be phosphorescent in the gills. This phenomenon was only noted on specimens gathered in damp weather just before a storm.

Picea Menziesii. (Gard. Chron., xxv., p. 728; two figures.)

Platanus occidentalis. (Gard. Month., xxviii., pp. 165, 166; one figure.)

Quercus virens.—The American Live Oak. (Garden, xxix., p. 532; one cut.)

Botanical Notes.

Medicinal Plants wanted. Dr. C. F. Millspaugh, of Binghamton, New York, is anxious to obtain typical, living, flowering specimens of *Spigelia Marilandica*, *Stillingia sylvatica*, *Eryngium yuccæfolium*, and *Euphrasia officinalis* for illustration in his work.

Observationes analyticæ in Fungos Agaricinos Italiæ borealis. Under this title Dr. Pietro Voglino has issued a pamphlet on the Agarics of Northern Italy, illustrated by fifty figures. He concludes that from the form and dimensions of the spores and basidii every species may be distinguished.

Histoire des Herbiers. Dr. St. Lager. (Pamphlet, pp. 120, Paris, 1885.) We have just received this review of the origin and growth of Herbaria in which the author claims that the history of the subject has been neglected, and has spent considerable time in searching for the originator of the first Herbarium. He finally comes to the conclusion that to John Falconer, an Englishman, belongs that honor, for in 1545 his collections excited the admiration of Italian botanists at Ferrare, but unfortunately they have not been preserved. The oldest in existence is that of Jean Girault, Lyons, 1558, and next that of Aldrovani and Cesalpino, 1553–1563. Many pages are devoted to the enumeration of the plants, and descriptions of the collections of Girault, Cesalpino, Rauwolf and G. Bauhin, all ante-Linnæan.

Hymenomycetes Britannici, by the Rev. John Stevenson. In two volumes with illustrations. Vol. I *Agaricus* to *Bolbitius*. William Blackwood & Sons, Edinburgh and London, 1886, p. 372.

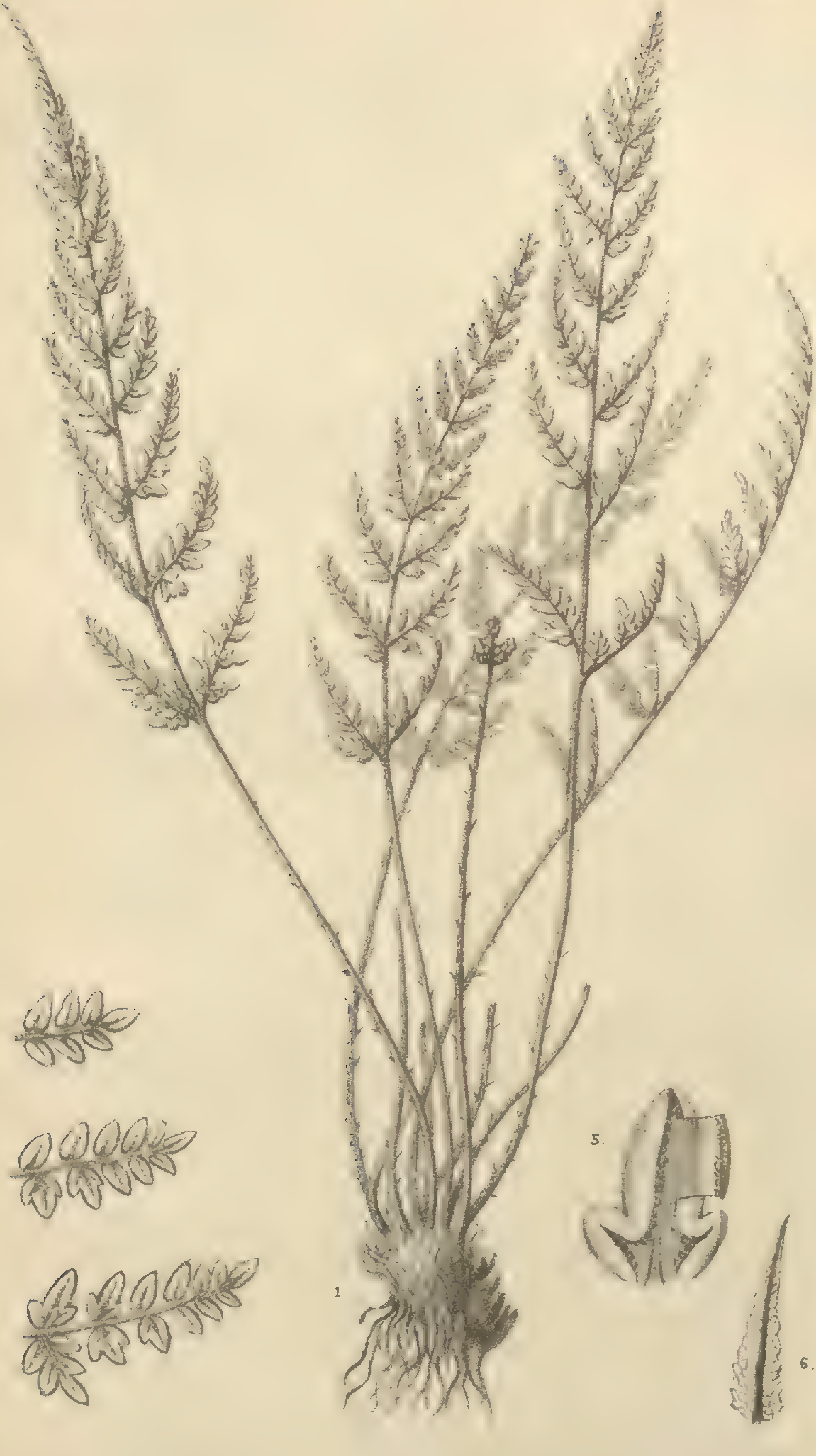
The first volume of Mr. Stevenson's book has at last appeared, and will be received by the British student of Mycology as a boon, inasmuch as hitherto the descriptions of our Hymenomycetes have been scattered without order in various publications. The main idea of the work is undoubtedly to give the English speaking student of fungi, in his own language, an accurate retranslation—or rather an interpretation of the work of Fries. With this object Mr. Stevenson has availed himself of the descriptions in the *Hymenomycetes Europæi* as a basis, and has incorporated with these, not only the fuller details given in the *Monographia*, but also whatever information is contained in the smaller works of Fries. The illustrations of genera and subgenera are from nature, by Mr. W. G. Smith. The spore measurements are from various authors, and are all given in micromillimeters. One noticeable feature of the book is the fullness with which the description of the subgenera are given, and in the large subgenera those of the series. This is a great improvement upon the scanty manner in which they have been treated in our previous text-books.

CHARLES B. PLOWRIGHT,
8 King St., King Square, London.

Proceedings of the Club.

The regular monthly meeting of the Club was held at Columbia College June 8th, 1886. Dr. G. D. Holsten and W. A. McCorn were elected active members, and Ensign W. E. Safford, U. S. N., and E. C. Smith, of Augusta, Maine, corresponding members. Dr. Newberry exhibited a new, pear-shaped variety of orange, recently received in the New York markets from Southern California, and remarked on the progress of orange culture in that region. Mrs. Britton distributed specimens of *Aspidium spinulosum*, Willd., var. *dilatatum*, Eaton, and *A. cristatum*, Swartz, in several forms, some of them approaching var. *Clintonianum*, Eaton, from Boonton, New Jersey, and exhibited *Alyssum incanum*, L., from Dedham, Massachusetts, where, in July, 1882, it was abundant along the railroad and apparently naturalized; it is native of Central Europe. Mr. P. H. Dudley read some further notes on the formation of ducts in chestnut wood. Mr. Schrenk remarked on the phenomena of certain leaves of shedding water, especially those of *Impatiens*, which have a perfectly smooth epidermis, and attributed it to the abundance of cutine. Those of the Snowberry have a similar power. Dr. Newberry called attention to a similar action by the velvety leaves of *Abutilon Avicennæ*. Dr. Britton exhibited specimens of the Dusty Miller, *Senecio Cineraria*, DC., collected by Prof. E. H. Day on the sea beach of Monmouth County, New Jersey, and remarked that it had now been noticed at several places on the beaches in the vicinity of New York, and might well be regarded as adventive; also *Carex ptychocarpa*, Steud., from Lake Hopatcong. Ensign W. E. Safford, U. S. N., read the announced paper of the evening, entitled "A comparison of the Flora of Ross County, Ohio, with that of Southern New England."

The Club then adjourned until the second Tuesday in October.



C.E.Fox ad del.

B.Meisel, Lith.

NOTHOLÆNA PRINGLEI, n. sp.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XIII.] New York, August, 1886. [No. 8.

Fern Notes, IX.

With Plate LVIII.

Geo. E. Davenport.

LIST OF FERNS COLLECTED ON THE MOUNTAINS NEAR THE CITY OF CHIHUAHUA, MEXICO, DURING THE SEASON OF 1885, BY C. G. PRINGLE, OF CHARLOTTE, VERMONT.

The numbers are those on Mr. Pringle's tickets, and include some not given on his distribution list. Those ferns left undetermined on his published list will be found here fully named.

Adiantum Capillus-veneris, L. Rocky hills near Chihuahua.

456—*Adiantum tricholepis*, Fée. Santa Eulalia Mt.; April. A single station, yielding only a few specimens; none for distribution.

Mr. Pringle wrote that he "travelled many miles over the steep, rocky hills of Chihuahua, searching their cliffs in vain for more. The clump was growing from black mould which had accumulated in a fissure of a cliff, about a foot wide, and was sheltered from direct access of rain and sunshine by a projection of rock near the upper part of the fissure. I never found another place just like it, but am confident there is plenty of the fern hidden amongst the cliffs which render difficult of access for a score of miles the summits of the mountains within view from the city of Chihuahua."

The fronds on these specimens of Mr. Pringle's agree perfectly with the excellent figure of this species in Ferns of North America, Prof. D. C. Eaton (Plate 59), but the rootstocks render some modification of the description necessary, as in these plants they are cæspitose and not creeping. If this is really Fée's plant, it is difficult to understand how he could have described its rootstock as being "rampant"—creeping—unless we suppose that it was inferential from imperfect material in his hands.

Mr. Baker says that Mr. Pringle's plant exactly matches the type specimen in Kew Herbarium from Liebmann, marked *A. Chilense*, Klf., var. *pilosulum;* and in Synopsis Filicum the normal form of that species, is, with others, placed under *A. Æthiopicum*, L.

444—*Asplenium Trichomanes*, L., var. REPENS, n. var. Wet ledges, rocky hills, near Chihuahua; October.

A most interesting small fern with the habit of *Camptosorus*, the proliferous fronds reclining, rooting at the prolonged filiform apices, creeping, and forming closely appressed mats. Apparently identical with *A. heterochroum*, Kunze, but as there is nothing to show that the normal form of Kunze's plant was proliferous, ours may be accepted as a good variety, whether under that species or *Trichomanes.*

Dr. Hooker placed Kunze's plant under *A. Trichomanes* in Species Filicum, and there is apparently no good reason for otherwise disposing of Mr. Pringle's.

442—*Cheilanthes leucopoda*, Link. Ledges, Santa Eulalia Mt.; March.

This and 457 appear to me very doubtfully distinct. They seemingly differ only in one plant being more delicate than the other. 442 has heretofore been thought to be more delicate, but in Mr. Pringle's collection it is more robust. Judging from the number of specimens it appears to have been abundant, thriving vigorously on exposed limestone ledges, while the more delicate 457 grew sparingly on cool, shaded cliffs.

The differences between the two are, on their face, exceedingly slight. Both are nearly equally glandular pubescent; the difference in the color of their stipites is no greater than in many other ferns—in 442 they are usually straw-colored, but in some plants they are quite as brown as in 457—and other differences may be readily accounted for by the character of different habitats, and varying conditions of growth. But while I am strongly inclined to consider these two ferns as merely good forms of one species, I have not made an examination thorough enough to justify so uniting them here.

468—*Cheilanthes Lindheimeri*, Hook.

449—*Cheilanthes microphylla*, Swz.

459—*Cheilanthes myriophylla*, Desv.

453, 454—*Cheilanthes tomentosa*, Link., var. *Eatoni*, Davenport, 453 being nearest to the species, which was also collected but not numbered.

445—*Cheilanthes Wrightii*, Hook.

457—*Cheilanthes viscosa*, Kaulf.

465—*Gymnogramme Ehrenbergiana*, Klotz. (G. *hispida*, Mett.)

466—*Notholæna Aschenborniana*, Klotz.

462—*Notholæna ferruginea*, Hook.

463—*Notholæna Grayi*, Davenport.

Notholæna Hookeri, D. C. Eaton. (No number.)

451—*Notholæna nivea*, Desv.

464—*Notholæna sinuata*, Kaulf.

All variously distributed about the limestone ledges, cool slopes and shaded cliffs on the rocky hills near Chihuahua; March to October.

452—*Notholæaa cretacea*, Liebmann; (*N. Californica*, D. C. Eaton; *N. candida*, Hk., var. *cretacea*, Davenport.)

The very fine series of forms of *Notholæna candida*, Hook, from Texas, recently collected by Reverchon, have quite convinced me that this fern, which has heretofore been referred to that species, should be recognized as distinct. That it is Liebmann's plant I cannot doubt. Mr. Baker assures me that it agrees perfectly with Liebmann's type in the Kew Herbarium, and an examination of a pinna from a Kew specimen sent to me by him, satisfies me that such is the case. It moreover agrees with Liebmann's original description* quite as well as most specimens do agree with their descriptions, which are often necessarily drawn up from imperfect material without sufficient allowance for natural variations within specific limits.

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* I am indebted to the kindness of Mr. Sereno Watson for looking up for me the following description :—

"*Notochlæna cretacea*, Liebm.: fronde coriacea 6 9 poll. longa, lamina 1½-2 pollices longa, 1½ poll. lata, stipite 5 7 pollicari, subrhomboidea parum acuminata obtusa bipinnato-pinnatifida, sursum decrescente pinnato-pinnatifida, demum pinnatifida, pinnis patulis oppositis sessilibus adnatis, infimis basin versus pinnato pinnatifidis sursum pinnatifidis, inæquilateris, latere exteriori imprimis basin versus superius superante, deltoideis, pollicem longis et latis, pinnulis lanceolatis obtusis alternis, laciniis suboppositis oblique ovatis obtusissimis decurrentibus, sinubus acutis curvatis; pinnis mediis lanceolatis ceterum similibus; pagina anteriori viridi globulis cretaceis adspersa, posteriori strato denso cretaceo flavido-albo obducta; rhaci costisque antice leviter canaliculatis pulverulentis, postice convexis nigris; sporangiis majusculis marginalibus fuscis, sporis sphæricis nigris; stipite tereti nigerrimo nitido basin versus hic illic squamis membranaceis lanceolatis brunneis instructo.

Rhizoma subterraneum obliqvum breve cæspitosum squamis rigidis lanceolatis margine membranaceo lacero adpressis obsitum.

Our California plant differs from the Mexican only in having brown stipites and rachises instead of black, a difference of hardly more than varietal significance, if even that, and characteristic of other species in this genus, notably in *N. nivea*, where the stipites and rachises vary from dull chestnut brown to glossy black. Sometimes in Californian plants the upper surfaces of the segments appear to be more copiously sprinkled with powdery glands, but as I have only seen a few Mexican specimens, while several hundred California plants in all conditions of growth have passed through my hands, I cannot say to what extent this excess may go. The glands are clearly deciduous in both cases, and in an equal number of Mexican specimens it is probable that some would be found as thickly coated as any from California.

441—NOTHOLÆNA PRINGLEI, n. sp. (Plate LVIII.)

Rootstocks tufted, clothed with black subulate narrowly winged scales with sinuately toothed or variously incised membranous margins, those at the base of the stipites broadest; fronds 3 to 8 inches tall; stipites 1 to 4 inches long, brown, becoming grey with age, furrowed along the face and sparingly clothed with deciduous scales and white powdery glands, the scales similar to those at the base, but paler; laminæ 2 to 4 inches long, oblong or ovate lanceolate, bi- to tripinnate with obliquely ascending alternate stalked pinnæ, more or less distant, the lowermost from ½ to 1 in. long, pinnules sessile or nearly so, segments oblong or roundish, the margins strongly revolute, covering the brown sori; rachises brown, the primary rachis channelled along the face; texture subcoriaceous, both surfaces coated with white ceraceous powder.

Voxer selskabelig i Klöfter af bratte Kalkklipper over S. Lorenzo i Nærheden af Tehuacan (5400′); samlet i Frugt i December.

Udentvivl en af de smukkeste Arter af Slægten, og let adskillelig fra alle hidtil bekjendte."—Mexicos Bregner, F. Liebmann, Kjobenhavn, 1849, p. 64.

REMARKS.—The above description apparently calls for a taller plant than is represented by Mr. Pringle's, and most of the California specimens, but some of the latter in my possession come very near to the dimensions given, and the description given by Prof. Eaton in the Bulletin for May, 1873, from Mettenius, recognises some very much less.—G. E. D.

In crumbling lime rock, cliffs and banks of gulches, Santa Eulalia Mt., Chihuahua, Mexico. Collected by C. G. Pringle, April, 1885. Also in Parry and Palmer's collection of 1879-'80, from Coahuila and Nuevo Leon (1382, 1383), the specimens weather-beaten and nearly destitute of powder.

It was Mr. Pringle's desire that this fern be given to Dr. Edward Palmer, who, with Dr. Parry, had previously collected it, but learning that Mr. Baker had named another species in this genus (991 Parry and Palmer Coll., l. c.) for Dr. Palmer, and Dr. Parry's name being also in use, it seemed to me eminently proper to give it to one whose ample collection of perfect material so clearly established its specific value.

Mr. Pringle wrote that during most of the year the plants are as dry as the soil in which they grow, and as white as the lime debris which surrounds them. This gives to the whole plant a contracted appearance which makes the fronds seem narrower than they really are. The species stands nearest to *Notholæna nivea*, Desv., but in that fern the fronds are usually more compound, with powder only on the under side of the segments, are less coriaceous in texture, and the stipites are uniformly terete.

The wonderful tenacity with which this elegant species holds to its life-purpose through so many months of severe drouths, fitly commemorates the indomitable energy and perseverance of the excellent botanist to whom it is here dedicated.

447—*Pellæa aspera*, Baker. Rocky hills near Chihuahua; October.

448—*Pellæa cordata*, J. Sm. Under dry limestone cliffs; October.

The typical form, and very distinct from the Arizona and New Mexican plant (also collected here by Mr. Pringle) now passing under this name, but which must, in my judgment, be otherwise disposed of. The distinctive characters of the two plants will be pointed out in my remarks on the next species.

461—*Pellæa intermedia*, Mett.—at least in part—var. *pubescens*, Mett. (*P. cordata* of my catalogue and check list; *P. andromedæfolia*, Fée, var. *pubescens*, D. C. Eaton.) Near Chihuahua, Pringle. Also from New Mexico, Chas. Wright, 825 in part; Rusby, 1880; Arizona, Lemmon, 1881-'82.

Mr. Baker assures me that this and 448 are both recognized at Kew as forms of *P. cordata*, J. Sm., but thinks that they are distinct enough for two good varieties. I must confess, however, that I cannot understand why two plants so entirely distinct in every way should be retained under one specific name.

On the one hand, we have in 448 a plant with a short, stout rootstock as thick as one's finger, bearing clustered herbaceous annual fronds, the veins plainly visible; on the other hand, in 461, a plant with a long, slender, wide-creeping rootstock, bearing scattered perennial sub-coriaceous fronds, the veins obscure, and it hardly seems possible to have stronger or more valid specific characters.

The difference in texture between these two plants is much like that between *P. Breweri* and *P. Bridgesii*; or, although perhaps in a less marked degree, *P. gracilis* and *P. atropurpurea*. The difference in their rootstocks and mode of growth is essentially the same as in *Aspidium Nevadense* and *Aspidium Noveboracense*, a difference constituting almost the one character upon which *A. Nevadense* was founded. Mr. Pringle, whose thorough knowledge of plants and extremely careful observations render his views too valuable to be set aside lightly, writes very positively in regard to the distinct character and habit of these two ferns, and considers them two good species rather than mere varieties of one.

I do not make out to my entire satisfaction the *Pellæa intermedia* of Mettenius, but Kuhn's description of it in Linnæa[*]

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[*] I give here the description of *Pellæa intermedia*, Mett., as I have transcribed it from Linnæa :—

Pellæa intermedia, Mett.—Rhizoma repens, paleis 1-2''' longis, rigidulis, rufescentibus, mox lato nigro-carinatis dense vestitum ; folia subdistantia, membranacea, glaberrima ; petiolus 4-6'' longus cum rachi strictus, pallide rubellus, teres, lævis; lamina 4-6' longa, ovata, bipinnata ; pinnæ suboppositæ, distantes ; pinnulæ 2-3 jugae, petiolulatæ, cordato-ovato, obtusissimæ ; nervi densi subimmersi ; sori margine revoluto velati.—Mexico (Hb. Fournier).

Var. *pubescens*. Mett. Rhachi partiali pubescente. *Pellæa flexuosa*, Hook. Spec., ii., 149, partim. Nov..Mexico. (Wright 825.)

Hybrida forte inter *P. saggittatum*, Cav. et *P. flexuosam*, Klf., rhizomate paleisque cum posteriore, lamina cum priore congruens, ceterum et *P. flexuosa* rhachi laevi et pubescenti varians."—Kuhn in Linnæa, xxxvi, p. 84.

REMARKS.—The only apparent discrepancy here is in the membranaceous fronds and cordate ovate pinnules, but as the former is inconsistent with densely immersed veins, and the latter is a variable character, I consider that the description as a whole points more clearly to the plant under consideration than to any other.—G. E. D.

fits our plant very well. The type appears to have been founded on a glabrous Mexican plant, and the var. *pubescens* subsequently established as one of Chas. Wright's No. 825 from New Mexico. I have it from Mr. Baker that one of the specimens included under Chas. Wright's 825 agrees with Mr. Pringle's 461, and also with Rusby's plant from New Mexico, from which it is evident that a portion of Wright's 825 was not true *flexuosa*.

In the absence of more convincing evidence to the contrary, therefore, it seems best to restore Mettenius' species and refer to it this plant of Mr. Pringle's which answers to the var. *pubescens*. Specimens collected in New Mexico by Rusby and in Arizona by Lemmon, and distributed as *P. cordata* or as *P. Andromedæfolia*, var. *pubescens*, must also be so referred. The *P. cordata* of my Catalogue Supplement and Check Lists thus becomes *Pellæa intermedia*, Mett.

440—*Pellæa pulchella*, Fée. Limestone ledges, Santa Eulalia Mts.; March.

446.—*Pellæa ternifolia*, Link. Grassy summits, Santa Eulalia Mts.; November.

443—*Polypodium thysanolepis*, A. Br. Cold cliffs, rocky hills; October.

445—*Woodsia Mexicana*, Fée. Wet ledges; October.

450—*Psilotum complanatum*, Spring. Seams of rocky hills; October.

EXPLANATION OF PLATE.

1, plant. 2, a lower pinna. 3, a middle pinna. 4, an upper pinna. 5, a lobed segment with section rolled back showing sori. 6, scale from base of stipes.

The Nectary of Yucca.

By William Trelease.

The curious facts connected with the pollination of the capsular Yuccas discovered by Englemann and Riley* have attracted much attention and elicited a good deal of criticism, in most cases undeserved. So far as I have observed, none of this has applied to the behavior of the Yucca moth (*Tegeticula Yuccasella*, Riley), while in the flowers, but mainly to the necessity for its intervention in their fructification.

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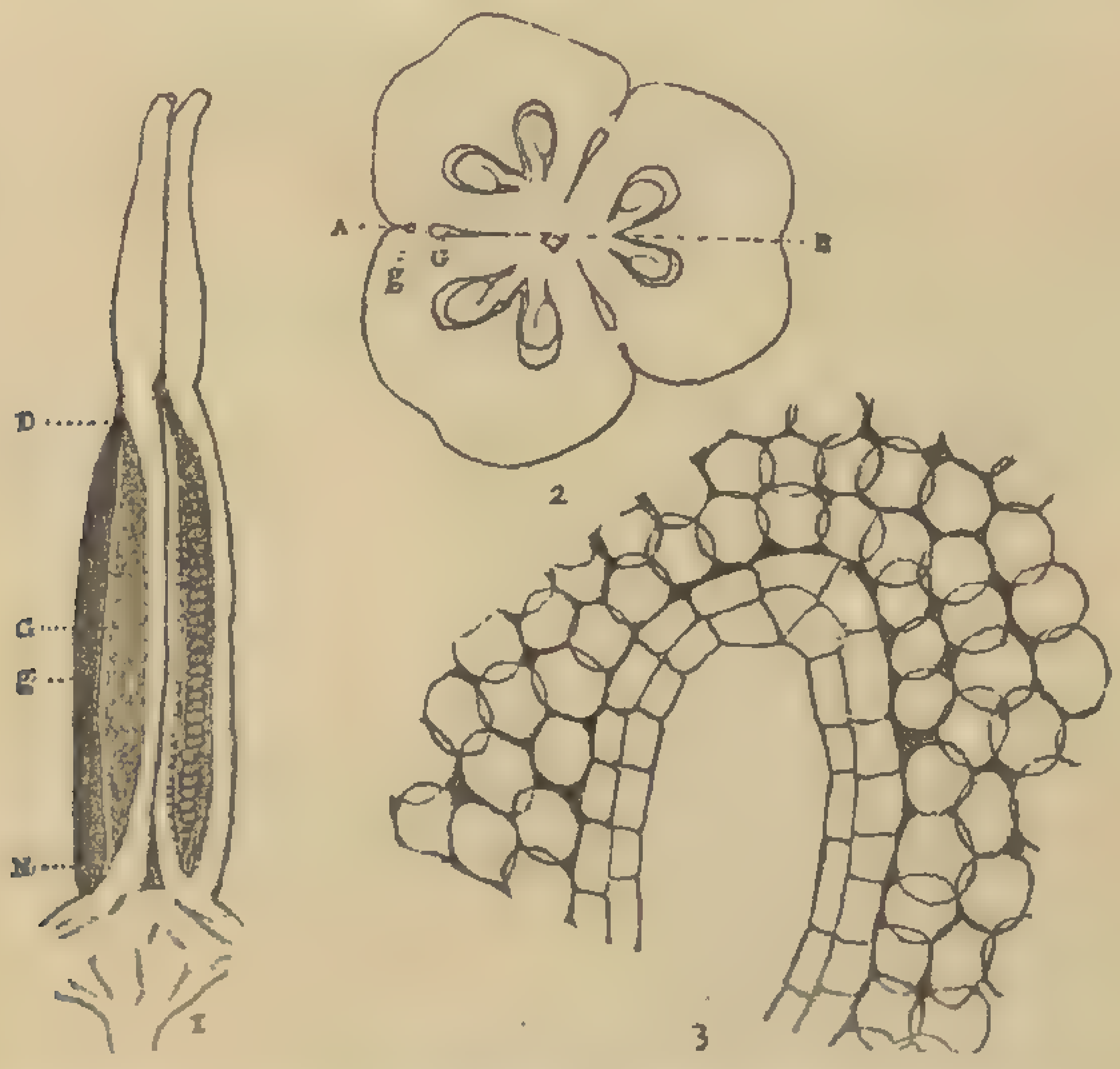
*Engelmann: Bull. Torrey Bot. Club, iii., 33, 37; iv., 63. Riley: Trans. St. Louis Academy, iii., 55, 178, etc.

Since reading his articles, I have had a suspicion that Professor Riley must have been mistaken in his belief that the stigmatic cavity is nectariferous,* as I know of no instance in which a liliaceous flower possesses a stigmatic nectary. But it was not until the present spring that I had an opportunity to give the flowers a careful examination. I then found, as I had expected, that the stigmatic tube contains no secretion aside from that which is customary to organs of this character, namely the slight amount of moisture, of a more or less gummy nature, that apparently serves as a stimulus to the nascent pollen-tubes.



In *Yucca*, as in many other Liliaceæ and related endogens, the nectar glands (G, figs. 1 and 2) occur within the partitions that separate the three cells of the pistil, forming thin pockets extending nearly from the base to the summit of the ovary. These pockets are entirely closed except at the top, where they open externally by a contracted pore (D, fig. 1). Nevertheless, they represent superficial structures, since they occur within the suture corresponding to the external (dorsal) surfaces of the carpels which constitute the compound pistil. They are lined by a double series of flat pavement-cells (fig. 3) homologous with the external epidermis. It is these closely set flat cells—very different from the round, loosely connected cells of the surrounding pulp—which constitute the secreting tissue or gland proper.

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* Trans. St. Louis Acad., iii., 59, 60.

Brongniart,* who studied this class of glands very thoroughly, could find no external opening to these of *Yucca*, although *Y. gloriosa* is included in his list.† He was, therefore, of the opinion that they must communicate with a narrow canal which runs between the carpels from base to summit, and which, as Riley has stated, and as I have attempted to show in figure 1, passes above into the stigmatic cavity, into which the three cells of the ovary open by narrow but unmistakable passages. Such stylar or intrastylar canals communicating with the ovary are not infrequent in the vegetable kingdom,‡ the loose, more or less deliquescent cells which line them replacing the conducting tissue of such plants as have a solid style, in the guidance and nutrition of the pollen tubes.

Another point which misled Brongniart was the failure to detect nectar about the pistil, as in *Allium*, *Hyacinthus* and other genera. The reason for this appears to be twofold. The amount of secretion under the most favorable circumstances in *Yucca filamentosa*, to which my remarks apply, is very small, nor is it discharged externally at the point D, where the gland opens, but, as may be seen from a comparison of figures 1 and 2, it is poured at this point into a capillary tube (g), enclosed by the closely applied but not outwardly united lobes of the ovary, in which it flows downward to a point (N, fig. 1) at the base of the pistil, where the tube widens slightly into a contracted triangular pore, opposite the base of a petal, and discharges the scanty supply of fluid, which I have never seen more than filling it, while in many cases this opening is not even perceptibly moistened.

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*Mémoire sur les glandes nectariferes de l'ovaire -Ann. des Sci. nat., 4th Ser., ii. 1. See also Grassmann: Die Septaldrüsen.—Flora, 1884, Nos. 7-8; and abstract in Bot. Centralblatt, xix., 5.

† Pp. 5-6 of reprint.

‡ See Behrens: Untersuchungen über den anatomischen Bau des Griffels und der Narbe. Inaugural Dissertation, Göttingen, 1875.

The structure, as I have described it, agrees with the generalization of Grassmann * for all Liliaceæ with septal glands, except *Allium*, where the original opening of the gland is lower, but otherwise similar. It can be made out by careful longitudinal sections like that figured, or even better by breaking the fresh ovary lengthwise between two carpels, when the full length of the gland is easily laid open. I have also convinced myself that there is no connection with either the ovarian cells, the intrastylar canal or the stigmatic cavity that prolongs them both, by cutting serial cross-sections of the ovary like that represented in figure 2, through the entire length of the pistil, repeating them many times at the critical points, namely, the top and bottom.

There is a more or less prevalent opinion that the glands of plants and animals differ in the superficial character and greater simplicity of the former; excepting, of course, those internal resin and oil passages which do not open for the liberation of their secretion—*e. g.*, the resin passages of Coniferæ and the oil receptacles of the orange, mints, etc. It is true that the number of vegetable glands which are situated within the plant but discharge their secretion at the surface through a duct-like opening is small, as I endeavored to show in an unpublished communication to the Boston Society of Natural History a number of years ago; but they are occasionally met with. The follicles at the mouth of *Nepenthes* pitchers, described, I believe, by Mr. Potts in the Proceedings of the Philadelphia Academy, some years since, are the simplest type of this sort of structures, to which also belong the protective nectar glands on the peduncles of the Cow Pea (*Dolichos* sp.), which I figured in the American Bee Journal, in 1880; and presumably in the similar organs of species of *Apios* and *Phaseolus*. These latter organs, which correspond to abortive flower buds, are very complex and will well repay a careful study of their developmental history.

The nearest approach to such lobulated glands of animals as the salivary glands is, however, found in the ovarian glands of the endogens. In some cases † these are produced into contracted and much elongated ducts, while in others* their secreting surface is increased by a more or less sinuous development, resulting in prominent longitudinal folds in the last two genera referred to, and other epigynous Bromeliaceæ, where the three glands are also, for a part of their extent, confluent, merging into the intracarpellary cavity, although they do not appear to discharge through this at the stigma, their ducts offering a freer exit for the nectar into the base of the flower.

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*See Bot. Centralblatt, 1884; xix., 6 7.

† *E. g.*, *Strelitzia*, as figured by Brongniart, l. c., pl. 4, f. 3.

The glands of *Yucca* play a very unimportant part in the pollination of the flowers, a fact which apparently explains the partial loss of secreting power, and is unquestionably connected with their adaptation to the good services of the Yucca-moth. In watching a good many of these insects at night, while engaged in pollinating the flowers and depositing their eggs, I saw only a single one attempt to feed, and this tried to probe the three glands of a flower at the point D, where the glands open into the conducting grooves. Whether it succeeded in penetrating into the latter or not could not be seen. It remained at each gland not over two or three seconds, and on leaving the flower was captured and proved to be a male. During the day the moths of both sexes, as well as the bogus Yucca-moth *(Prodoxus)*, remain in the flowers, commonly standing on the filaments with their heads at the bottom of the corolla. My impression is that they feed at this time; but the disturbance necessitated by opening the partly closed flowers is sufficient to cause them to stop, if this is true, and I have, in point of fact, never seen them thus engaged.

I was not able to see the insects engaged in collecting pollen, but there is no reason to doubt the entire accuracy of Professor Riley's statement‡ that the females deliberately go to the stamens and accumulate a supply of pollen on their remarkable spinose tentacles, before beginning the work of pollination and oviposition. While engaged in this work, as he has stated, they will bear the full blaze of a lantern in the flower, and may even be watched through a lens without desisting, though, if the light is too suddenly turned

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***Strelitzia*, l. c., pl. 4, f. 6; *Melinonia*, l. c., pl. 3, f. 1-4; *Billbergia*, l. c., f. 6-10.

‡ Amer. Naturalist, xvi, (1882), pp. 62, 63.

upon them or if the plant is jarred, they sometimes remain quiet for a time or hurriedly scuttle out of the flower and take wing. I can corroborate in every important detail the account given by Riley of the method of oviposition and pollination, either of which may occur first, while in a given flower both are usually repeated many times before the moth goes to a new one. The energetic manner in which the little insect works its head up and down* while depositing pollen in the stigmatic cavity, is very interesting, and cannot fail to convince a person who sees it that there is as much object in its work as in the nest-building of birds, or other so-called instinctive operations of the lower vertebates. To more effectually accomplish its mission, the moth usually pushes the pollen further into the cavity than its tentacles can reach, using its tongue for this purpose, and it is perhaps this action which led Riley to believe that it sips nectar from the stigma while engaged in the act of pollination. Once a pair of moths were seen to copulate in the flower, the union not lasting more than three or four seconds, the female actively running about the flower in the meantime, and immediately resuming the labor of oviposition on its completion, when the male flew to another flower.

If what I have observed may serve to disprove any positive value of their nectar in the pollination of *Yucca* flowers, it only adds to the general interest of the subject; for it shows that not only the act of collecting the pollen is performed voluntarily and without any food compensation, as stated by Riley, but also that of transferring it to the stigma—a case without a parallel, so far as I know, among entomophilous flowers, if we exclude those with false nectaries; and I doubt if these are all fully understood.

The student who wishes to look up the literature of the pollination of *Yucca*, will find an indication of the principal papers on the subject in Thompson's catalogue of books and papers relating to the fertilization of flowers, in the English edition of Müller's Fertilization of Flowers, to which should be added: Meehan, Penn Monthly, 1876, 836; Bot. Gazette, iv., 242; Proc. Phila. Acad., 1880, 355; Amer. Agriculturist, 1872, 461; 1873, 223; Müller, Wechselbeziehungen, 39; Darwin, Cross and

* Riley. Trans. St. L. Acad. III. 60.

Self-Fertilization, 418; Gard. Chron., Jan., 1880, 81; July, 1880, 110. Other references occur in the additional papers to which I have already referred, as well as in many of these.

EXPLANATION OF FIGURES.

1. Longitudinal section of the ovary of *Yucca filamentosa*, on the line A—B of the next figure, ×2.

2. Cross section of the same, at about the middle, ×6.

3. A portion of 2, at G, ×200.

G, the nectar gland, opening at D into g, the conducting groove into which its secretion is poured and in which it passes to N, where it appears at the outside of the ovary.

Since the foregoing was written I have had an opportunity to observe *Y. angustifolia* in full bloom in the Ute Pass, north of Manitou, Col. The nectar glands of this species are about as in *Y. filamentosa*, and open and discharge their secretion similarly, but I have found the latter rather more abundant. The stigma of *Y. angustifolia* is rather larger, and very green, as contrasted with the white stigma of *Y. filamentosa*, and its secretion is more abundant, so that frequently a prominent drop is visible between its lobes. The pistil differs in that the stigmatic cavity is short aud does not communicate with the ovarian cells, so far as can be seen with a three-fourth lens.

One or more species of *Pronuba* and *Prodorus* are met with in the flowers in considerable numbers. The opportunity has not offered for watching the former at night; but many of the flowers are pollinated, the abundant white pollen contrasting so strongly with the dark green stigma as to render its presence evident even to the naked eye. Scattering dried capsules on the stalks of last year and an abundant crop of this year's fruit attest the efficacy of this pollination, which could only have been effected by the moths in the flowers I refer to.

JULY 19, 1886.

Some Californian Polypetalæ.

BY E. L. GREENE.

STREPTANTHUS NIGER.—1 to 3 feet high, paniculately branching from near the base, glabrous and glaucous; leaves linear, 2 to 3 inches long, the lowest with narrow, divaricate, gland-tipped lobes or teeth, those of the branches entire, all sagittate-clasping; racemes loose, flexuous, not secund; pedicels ascending, an inch long; calyx very dark purple, very smooth and shining; sepals ovate-cymbiform, with a thick, obtuse, but prominent nerve; petals consisting of a stout, thick, lanceolate purple claw and a minute, veinless, white lamina; upper pair of filaments united almost to the summit, their anthers small and rudimentary, not polliniferous; pod about 2 inches long, nearly straight on the ascending or suberect, long pedicels; seed with a very narrow wing.

Point Tiburon, Marin County, April and May, 1886; collected only by the writer. Related to *S. glandulosus*, but perfectly smooth and very glaucous; otherwise readily distinguishable by the very small lamina of the petals, and the short suberect, long-stalked pods, in a loose, equilateral raceme. The rather large, subglobose calyx is nearly black.

STREPTANTHUS PERAMÆNUS.—A foot or two high, pilose-hispid; leaves sinuately toothed and auriculate-clasping; racemes somewhat secund; calyx a half-inch long, deep magenta; sepals all ovate-cymbiform, sharply carinate, the lateral pair turned inward behind the upper petals, the apex of each meeting that of the other in front of the uppermost sepal; uppermost pair of filaments united above the middle, thence divergent, but their anthers reduced and sterile; each anther of the lowest pair held within the folds of the corresponding petal; upper pair of petals a third longer than the lower, limb of all white, with purple veins, somewhat conduplicate; pods 3 inches long, arcuate-spreading, on pedicels of less than a half-inch; seed narrowly winged.

Oakland Hills; collected many years ago by Mr. Bolander, and again this year, by the writer. A most beautiful species, with the habit and pubescence of *S. glandulosus*, to which it has been referred; but the living plant reveals at once the singular irregularity of the calyx above pointed out. The lowest sepal is left apart from the others, and the three form, as it were, a broad upper lip, the two lateral curving around the uppermost one and meeting point to point in front of it.

THELYPODIUM LASIOPHYLLUM.—*Turritis* (?) *lasiophylla*, Hook and Arn., Bot. Beech., 321; *Sisymbrium reflexum*, Nutt., Pl. Gamb., 183; Watson, Bot. Cal. i., 41; Greene, Bull. Cal. Acad. i., 221.

Thelypodium neglectum, Marcus F. Jones, Am. Nat xvii., 875.—This exceedingly common Californian plant has always seemed to me entirely out of place in *Sisymbrium*. It is a coarse, stout herb, usually many times larger than our authors seem to know, often growing to the height of four or five feet, and when young its whole aspect as well as the flavor of its herbage are precisely those of several species of *Thelypodium* when in the same early state. And now, from the rare *T. flavescens* lately rediscovered near Antioch, by Mrs. Curran, I find it is only to be distinguished by its smaller flowers and fruit, and by its uncertain pubescence; I say uncertain, because the larger states of the plant are commonly quite glabrous; although in some of the forms there is a hairiness which extends even to the pods. Near the coast, at San Francisco and northwards, the plant is smaller, the stem quite simple and the pods pointless and erect. One would like to treat this as a distinct species, but there are larger intermediate states with pods spreading and even arcuate-recurved.

PHÆNICAULIS MENZIESII.—*Hesperis Menziesii*, Hook. Fl. Bor. Am., i., 60; Hook. and Arn., l. c., 322; *Cheiranthus Menziesii*, Benth. and Hook., Gen. i., 68; Watson, l. c., 35; *Phænicaulis cheiranthoides*, Nutt., in Torr. and Gray, Fl. N. Am. i., 89.

To us who are well acquainted with this unique looking Crucifer, no other opinion commends itself but that of Nuttall who, if he had not perceived it to be of a new generic type, would have referred it to *Pamya*, rather than to *Hesperis* or *Cheiranthus*. The flat ensiform pods are entirely foreign to both the genera last named, and the habit is in equally strong contrast with that of either. The deep, thick perennial roots are crowned by a distinct, often branching and partly subterranean caudex; and the flowering branches, whether called scapes or stems, are in reality only axillary, bracted peduncles. These are usually numerous, and always decumbent around the central tuft of leaves which terminates each branch of the caudex. Beyond this nothing is to be added to Nuttall's full and excellent description in Torrey and Gray, but his specific name must give place to the earlier one imposed under *Hesperis* by Sir William Hooker.

CALYPTRIDIUM PANICULATUM.—*Spraguea paniculata*, Kellogg., Proc. Cal. Acad., ii., 187, t. 56; Watson, l. c., 78; Curran, Bull. Cal. Acad. i., 132.

This plant, so fortunately rediscovered by Mrs. Curran two years ago, although long-styled like the original *Spraguea*, has the ultimately calyptriform corolla of the several species which have already been published under the Nuttalian generic name. By these circumstances and the close resemblance which it bears to both those species of *Calyptridium* which Mr. Watson has published, it appears utterly to invalidate the genus *Spraguea;* for genera cannot be rested on the mere length of styles and filaments, at least, when species are so perfectly one thing in habit, texture and properties. *Monocosmia*, the South American ally of these plants, while outwardly resembling them quite closely, appears well and strongly founded on its herbaceous, indehiscent, one-seeded capsule.

CALYPTRIDIUM UMBELLATUM.—*Spraguea umbellata*, Torr. Pl. Frem., 4, t. i; Watson, l. c., 77; Hook., Bot. Mag. 5,143.

Notes on Marsilia quadrifolia.

Near the obelisk in Washington, D. C., are a series of fish ponds used by the U. S. Fish Commission for German carp, etc. Four years ago, among various plants set out in order to ascertain their relations to fish culture, were *Marsilia quadrifolia* and *M. sylvatrix*, from Germany. The latter died out the next winter, but the former appears to have established itself, perhaps permanently, as specimens have been collected this year in various places remote from the point of introduction. This spreading cannot be due to artificial aid, as the first supply (a part of which came also from Texas), was rooted out and an effort made to destroy it entirely, as experience showed it useless, if not injurious to the fish.

I collected and placed a quantity of it in a large dish kept supplied with water, where it grows very thriftily and is rather pretty, so that it may prove an addition to our list of aquarium plants. The first editions of Gray's Manual do not contain this plant, which first appears in that of 1863, Addenda, collected by Dr. T. F. Allen in Bantam Lake, Litchfield, Conn. Also found in Fresh Pond, Cambridge, Mass. (see Wood's Class-Book, 1874) and at Dallas, Texas (this Journal, 1872 p. 23). This station here makes the third east of the Mississippi, so far as I know. But one species has been found east of the Rockies, and another in California. Among the first notices of this plant is a communication from Braun to Dr. Englemann, published in Silliman's Journal, 1847; and one of the best descriptions with figure will be found in Meehan's Flowers and Ferns of the U. S., Vol. II.

WM. H. SEAMAN.

[*Marsilia quadrifolia* has been reported as naturalized and fruiting abundantly at Dedham, Mass., by Mr. Henry L. Clapp (See BULLETIN, viii., pp. 127 and 144). In Underwood's "Our Native Ferns and their Allies," pp. 114, 115, six species of *Marsilia* are recognized; all of which are reported from stations to the east aud southeast of the Rocky Mountain region.—ED.]

A New Species of Potamogeton.

POTAMOGETON CURTISSII.—Plant simple or occasionally branching, a little upwards of a foot in height; stem and branches slender; leaves all submerged, linear, 4-5 cm. long, ½-1 mm. broad at the widest part, tapering gradually to a point, the midrib with two very delicate nerves or a loosely reticulated space on each side of it; stipules hyaline, obtuse, 7 or 8 mm. in length; peduncles 8-15 mm. long, somewhat clavate, erect, axillary and racemosely disposed, five or more of them at intervals of one or two inches along the upper part of the stem; flowers small, four or five; spikes capitate; fruit not seen. ✓

Collected last May in the Blackwater river, Northwest Florida, by the indefatigable explorer of that State, Mr. A. H. Curtiss, for whom it is named.

Mr. Curtiss also sent what appears to be a peculiar form of *P. natans*. It has small, acute, elliptical leaves, 4-6 cm. long by 5-15 mm. wide, and erect peduncles about 6 cm. long. It looks exactly like specimens in the Torrey Herb., from India, which are labelled *P. natans* var.

Any botanist who may discover this apparently small *natans* in fruit, would confer a great favor by sending specimens to the writer.

THOMAS MORONG.

Index to Recent American Botanical Literature.

Analytic Key to the Genera of Mosses recognized in the Manual of Mosses of North America by Lesquereux and James. Charles R. Barnes. (Bull. Purdue Univ. School of Science, No. 1, 1886.)

Prof. Barnes has rendered students of Bryology a valuable service in arranging this artificial key.

Botanical Notes. W. S. Devol. (Fourth Annual Report Ohio Agr. Expt. St., 1886, pp. 223-226.)

Consists mainly of a list of plants identified, principally weeds, grasses and forage plants, from all parts of Ohio.

Cactuses.—New Lower Californian. C. R. Orcutt. West American Scientist, ii.. pp. 46, 47; one figure.)

Mr. Orcutt publishes descriptions of a new species of *Echinocactus*, (*E. Orcuttii*, Engelm.) having cylindrical heads, 10 to 18 inches in diameter and 2 to 3½ feet high, and deep crimson flower 2 inches long; found in Palm Valley, Lower California; and of *Cereus phœniceus*, var. *Pacificus*, Engelm, a new form from Todos Santos Bay. Both are from manuscript notes by Dr. Engelmann. A wood-cut of the *Echinocactus* is given.

Catalogue of the Phænogamous and Vascular Cryptogamus Plants of Missouri. S. M. Tracy. (Pamphlet, 8vo., pp. 106; Jefferson City, 1886.)

A neatly printed list of plants hitherto found growing without cultivation in the State. 1785 species and varieties are enumerated, of which 59 are Pteridophyta.

Celery.—History of. E. Lewis Sturtevant. (Amer. Nat., xx., pp. 599-606; three figures.)

Contagious Diseases of Insects, S. A. Forbes. (Bull. Ill. State Lab. Nat. Hist., ii., pp. 257-321; one plate.)

Bacterial diseases of the European Cabbage Worm—by whose ravages the injuries of these pests have received a very important check—and of the Yellow-necked Apple Caterpillar and the Walnut Caterpillar, very similar to that of the *flacherie* of the Silk-worm, are described. The heliotype plate shows the *Micrococci* from a diseased Cabbage Worm. The *Muscardine*, another Silk-worm disease, is not bacterial, but is caused by the filaments of a hyphomycetous fungus; to this Professor Forbes attributes the disappearance of a vast host of the Forest-tent Caterpillar which devastated forests and orchards in Southern Illinois in 1883.

Cryptogams.—Guide to the Principal Orders and commoner New England Genera. F. LeRoy Sargent. (Cambridge University Press, 1886, pp. 39, pr. 75c.)

This convenient little guide is intended for the Summer School at Harvard University, but will be found useful by all beginners in the study of the more lowly plants, especially Fungi and Lichens.

Cylindrosporium.—Two New Species of. J. B. Ellis and W. A. Kellerman. (Journ. Mycol., ii., p. 81.)

Flora of Franklin Co., Ind.—Endogens. O. M. Meyncke. (Bull. Brookville Soc. Nat. Hist., No. 2, pp. 45-49.)

A continuation of the list of plants commenced in the first bulletin of this Society. Ninety-five species are here enumerated. The proofs have not been carefully examined, there being many inexcusable errors of spelling.

Forest Rotation.—Causes of. John T. Campbell. (Amer. Nat. xx., pp. 521-527.)

A readable article on this interesting subject. The writer concludes that in western central Indiana the seeds of no forest trees germinate unless they fall on the soil, those dropping on the accumulated leaves beneath the trees not being able to germinate. Also that birds and other animals are the principal agents in the dissemination of tree seeds, the crow being a prime factor in this process.

Fouquiera gigantea, n. sp. C. R. Orcutt. (West Amer. Scientist, ii , p. 48.)

Gray Herbarium of Harvard University. (Bot. Gazette, xi., p. 151.)

A brief description of the plan of arrangement, with a long account of the cases and their fastenings.

Harfordia, Greene and Parry.—A New Genus of Eriogoneæ from Lower California. C. C. Parry. (Proc. Davenport Acad. Sci., v., pp. 26-28; reprinted.)

The proposed new genus includes two species, *H. macroptera* (*Pterostegia macroptera*, Benth.,) and *H. fruticosa*, Greene (*P. fruticosa*, Greene, in Bull. Cal. Acad., iv., p. 212.)

Henry James Clark, 1826-1873. (Cat. Mass. Agr. Coll., 1886.)

Mr. Clark was Professor of Natural History at Amherst, and two of his works were botanical: "The Peculiar Growth of Rings in the Trunk of *Rhus toxicodendron*," (Proc. Am. Acad., iii., p. 335,) and "The Eccentricity of the Pith in *Ampelopsis quinquefolia* and *Celastrus scandens*." (Unpublished.)

How to Collect Certain Plants. (Bot. Gazette, xi., pp. 135-151.)

The editors of the Gazette have succeded in obtaining from specialists a series of suggestions for the satisfactory collection and preservation for the herbarium of many groups of plants. For the Cacti, Dr. Engelmann's Notes, by Professor Trelease; Willows, M. S. Bebb; Carices, L. H. Bailey, Jr.; Grasses, F. L. Scribner; Aquatics, Thomas Morong and E. J. Hill; Mosses, E. A. Rau and Clara E. Cummings; Charas, Dr. Allen; Lichens, F. L. Sargent; Fleshy Fungi, A. P. Morgan, C. H. Peck, H. W. Ravenel; Parasitic Fungi, A. B. Seymour and E. W. D. Holway; Marine Algæ, A. B. Hervey; Fresh Water Algæ, Francis Wolle; Desmids, Eloise Butler; *Nostoc* group, Dr. Farlow; Slime Moulds and Bacteria, Prof. Trelease; Yeast, Dr. Farlow.

Larches of Western North America. C. S. Sargent. (Gard. Chron., xxv., pp. 652-654, illustrated; also reprinted.)

There are two species of *Larix* in Northwestern America, *L. occidentalis*, Nutt., discovered by Douglass in 1826 on the Columbia River, and referred by Hooker to *L. Americana*, from which it was distinguished by Nuttall. This is a very large tree, reaching 200 feet in height, and was first introduced into cultivation in 1880, when Mr. Watson sent seedlings to the Arnold Arboretum. The second species, *L. Lyallii*, Parlatore, is a rare and local tree, discovered by Dr. Lyall during the British Boundary Survey of 1858-61, and recently detected by Mr. Brandegee at the timber line on Mt. Stewart, where it was a low, stunted tree, associated with *Pinus albicaulis* and *Tsuga Pattoniana*. Beautiful figures of the two species, drawn by Mr. Faxon, illustrate Mr. Sargent's paper.

Lichens of Grinnell Land. In Lieut. Greeley's account of the Franklin Bay Expedition, (New York, 1886, Vol. ii., p. 397), a list of the Lichens brought home is given by Rev. E. Leinhart of Washington. It appears that a large collection of Lichens was made, but unfortunately they had to be left behind, and only seven species were accidentally preserved which were collected in Grinnell Land and at Cape Baird. These were *Cetraria cucullata*, (Bell.) Ach.; *C. chrysantha*, Tuckerm.; *Peltigera aphthosa*, (L.) Hoffm.; *Placodium elegans*, (Link) DC.; *P. crenulatum*, (Wahlenb.) Tuckerm.; *Cladonia rangiferina*, (L.) Hoffm., and *Omphalaria* (?). This last was collected on quartz at the extreme northern point reached, and appears not to have been in a state to admit of its being satisfactorily determined. Mr. Leinhart compares it with *O. Silesiaca*, Koerb., but which, according to that author himself, (Parerg, p. 443), is the same as *O. phyllisca*, (Wahlenb.) Tuckerm., Syn., p. 140.

The writer remarks on the scarcity of *C. rangiferina* in Grinnell Land as compared with its abundance in Scandinavia. In the former it is rare and cannot form a source of food supply for animals.

NEW BEDFORD, July, 1886. H. W.

Lilium superbum. (Garden, xxx., pp. 8, 9; plate 551.)

Our native wild lilies are attracting much attention abroad, and are being successfully cultivated. The plate accompanying this description is particularly fine, and was drawn from plants grown in England. They succeeded admirably in moist, well drained situations.

National Herbarium at Washington. George Vasey. (Bot. Gazette, xi., p. 153.)

An enumeration of the various collections there preserved, made by Government expeditions and individuals, with an account of the arrangements and extent of the herbarium.

Pollen-tubes of Lobelia. B. D. Halsted. (Amer. Nat., xx., pp. 644, 645; three figures.)

Rhizocarps in the Erian (Devonian) Period in America. Sir Wm. Dawson. (Bull. Chicago Academy of Sciences, i., pp. 105-118; illustrated.)

Specimens and Specimen Making. Various prominent collectors. (Bot. Gazette, xi., pp. 129-134.)

Tradescantia Virginica.—Varieties of. G. A. Brennan. (Amer. Nat., xx., pp. 551, 552.)

A plant of the Spiderwort after thirteen years cultivation has developed dimerous, tetramerous, pentamerous, hexamerous, and even heptamerous flowers, which, in addition to the normal trimerous ones, have all been borne at the same time. The modifications have resulted from the addition of parts.

Trees and Tree Planting in Massachusetts.—Some additional notes upon. C. S. Sargent. (Ann. Rep. Mass. State Board Agric., 1886, p. 21.)

Vaucheria.—Some abnormal forms of. Douglass H. Campbell. (Amer. Nat., xx., pp. 552, 553; seven figures.)

Weeds mentioned in the Wisconsin Weed Law of 1884-5, *and several other weeds.* A. B. Seymour. (Third Ann. Rep. Agric. Exper. Station Univ. Wis., pp. 145-167; reprinted.)

The weeds that most need to be exterminated in Wisconsin are the Canada Thistle, Common Thistle, Burdock, Ox-eye Daisy, Cocklebur, Beggar's Lice and Couch-grass. Illustrations of all these are given, with notes on their introduction, and possibilities of their destruction.

Winter.—Botany in. Byron D. Halsted. (Amer. Nat., xx., pp. 553-556.)

Teachers will find this helpful.

Wisconsin Parasitic Fungi.—Preliminary List of. William Trelease. (Trans. Wisc. Acad., vi., pp. 106-144.)

Two hundred and sixty-eight species are enumerated, all of which have been examined by the author. The host plants are given, and a useful index to them is appended.

Woods and their Destructive Fungi. P. H. Dudley, C. E. (Pop. Sci. Month., xxix., pp. 433-444; illustrated.)

This is the first of two articles in which Mr. Dudley brings before the public some of the results of his investigations of woods and the causes of their decay. After calling attention to the injuries suffered by some of the specimens in the Jesup collection at the Am. Mus. of Nat. Hist., he proceeds to show the differences in microscopic structures of various woods, and has selected four of his beautiful photo-micrographs as illustrations. The Gymnosperms are represented by *Pinus palustris* and *Chamæcyparis sphæroidea* (White Cedar), and the Angiosperms by *Quercus alba* and *Liriodendron tulipifera.* After lamenting the fact that lumbering is now carried on throughout the year, and calling attention to the fact that timber cut in the spring growth will be most liable to decay, Mr. Dudley illustrates the penetration of fungi by a photograph of a plank showing the mycelium of *Polyporus radula.* The more common destructive fungi are also enumerated, and the article concludes with a comparison of the conditions in which decay is most and least likely to occur.

Yucca angustifolia. A chemical study. Helen C. DeS. Abbott. (Rep. from Trans. Am. Phil. Soc., Phil., 1886., pp. 254-284.)

Botanical Notes.

Specimens of Dentaria and Cardamine wanted.—Fruiting specimens of any species of *Dentaria* and *Cardamine* are wanted for examination by Sereno Watson, Cambridge, Mass. They will be returned if desired and postage refunded.

Lectures on the Physiology of Plants.—Sydney Howard Vines, (Cam. Univ. Press, England, 1886, octavo, pp. 710, pr. $5.00, In style, clearness and method this will prove a companion to Foster's Physiology of Animals, and deserves a place by its side. The chapters are in the form of lectures, twenty-three in number, sparsely illustrated, but containing clear deductions from the researches of the last ten years. Much space is given to Metabolism and Irritability, and the changes due to chemical and physical forces, with their effects on the assimilation and growth of plants, are discussed in these chapters. The last two chapters on Reproduction co-ordinate and bring out the analogies of this function throughout the Plant Kingdom, and will prove most interesting reading to those whose knowledge of German and access to periodicals is limited, and whose experience with the varied forms and nomenclature of Cryptogamous reproduction has been a source of confusion and discouragement. Copious references to bibliography follow each chapter.

Solanum tuberosum.—Nouvelles Recherches Sur le Type Sauvage de la Pomme de Terre. Alph. DeCandolle. (Archiv. Sc. Phys. et Nat., xv., p. 425.) Since the publication in 1883 of the "Origin of Cultivated Plants," there have appeared several articles on the potato, which have led M. DeCandolle to give more critical attention to those "organs and characters which it is not to the interest of man to see changed." In the potato the calyx and the leaves have remained practically the same since its introduction three centuries ago.

After comparing carefully the forms with obtuse calyx-lobes from Chili and Peru, collected in the Andes by Bridges, he makes a new species, *S. Bridgesii*, and also decides that those from the Argentine Republic are not *S. tuberosum*.

He says that our native species from New Mexico and Arizona, which Dr. Gray has called *S. Fendleri*, and *S. tuberosum boreale*, resemble more closely *S. verrucosum*, Schlecht., and holds that *S. tuberosum* and *S. Maglia* are specifically identical, that the differences which separate the tuberose species are very slight, and that they diminish with the increase of hybridization. The paper concludes with specific descriptions of *S. Bridgesii*, n. s.; *S. tuberosum*, L., var. *Chiloense*, var. *cultum*, var. *Sabini*, var. *Maglia*, and *S. Mandoni*.

Schimper's Microspores of Sphagna.—In Hedwigia, Vol. xxv., pp. 89-92, C. Warnstorf calls attention to Schimper's statement in 1858 (Entwickelungsgeschicte der Torfmoose, p. 31) that two kinds of spores exist in the *Sphagna*, one kind being large, tetrahedral (macrospores), the other smaller and spherical-polyhedral (microspores) and that they may be found in separate capsules—in which case the microspores occur in smaller capsules than the macrospores—or both forms together in the same capsule. Herr Warnstorf has succeeded in finding both kinds in separate capsules of *S. acutiforme*, vars. *robustum* and *tenellum*, and *S. acutifolium*, var. *luridum*, and both together in the capsules of *S. Girgensohnii*. The microspores are about one-half the diameter of the macrospores, and hence about one-quarter their volume. Schimper remarks that they result from the continued division of mother-cells into sixteen segments, the macrospores being produced by their division into four. Their function is unknown. This corroboration of Prof. Schimper's discovery is of great interest and importance, indicating the higher position of the Bog Mosses in the Vegetable kingdom, as compared with other Bryophytes, and agreeing in this respect with the greater complexity of their tissues, suggesting indeed, certain relationship to the heterosporous Pteridophyta. Herr Warnstorf's researches open a field of inquiry which should be followed up in this country, and we commend it to the attention of American Bryologists.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XIII.] New York, September, 1886. [No. 9.

Naiadaceæ in the Torrey Herbarium.

By Thomas Morong.

Plate LIX.

As it is of general interest to botanists to know something about the contents of our large public herbaria, I shall not need to make any excuse for naming and making some notes upon the species of Naiadaceæ contained in the Torrey Herbarium at Columbia College. Some service may be rendered to botany if students are directed to a collection where authentic or type forms of some of the species described in botanical works are to be found. I am also furnished an opportunity to describe several species which have long lain unnamed and unnoticed in the Herbarium.

In the following paper the specimens mounted on the same sheet are reckoned as one, unless from different localities or collectors. Those supplied by the writer are preceded by an asterisk.

As abbreviations, *spec.* stands for specimen; *sp.*, species; *for.*, foreign; *Am.*, American; *Eu.*, Europe; *Cont.*, Continental or Continent. Common botanical or State abbreviations need no explanation.

The tribe JUNCAGINEÆ is represented in the Herbarium by two of the four genera viz.: *Triglochin* and *Scheuchzeria.*

1. *Triglochin maritimum*, L. Spec. 45; Am., from Long Island to Puget Sound, California and Sitka; for., from France and India. The set of this sp. is all that could be desired.

2. *T. palustre*, L. Spec. 16; Am., from the shores of Niagara River and Chapman's So. Fl. Herb.; for., from Siberia.

3. *T. triandrum*, Mx. Spec. 8; from Key West and Apalachicola, Fla., and N. Car.; four of them from Herb. Chapman.

4. *T. bulbosum*, L. A sp. not found in Am., spec. 4; one in fruit, coll. by C. Wright at the Cape of Good Hope, in Ringgold and Rodgers' Expd., 1853-'56. Two from Corsica and Malta are labelled *T. Barrelieri*, Lois., a syn. of *T. bulbosum*, L.

5. *T. procerum*, R. Br. For. sp.; one spec. from Tasmania.

6. *T. centrocarpum*, Hook. For. sp. Several individuals in fruit of this pretty little sp. coll. at Tasmania, Ex. Herb. Hooker.

7. *T. flaccidum*, A. Cunningham. For. sp.; one spec. contributed by Dr. Asa Gray, coll. Raoul, New Zealand.

8. *Scheuchzeria palustris*, L. Spec. 23; Am., from Mass., N, Y., N. J. and Pa.; for., from Sweden, Norway, Russia and Switzerland.

The tribe APONOGETONEÆ is represented by *Aponogeton*, Thunb., and *Ouvirandra*. Thou.

Ouvirandra differs from *Aponogeton* only in having the parenchyma between the nerves of the leaf deficient, and is perhaps to be considered a sub-genus rather than distinct from *Aponogeton*.

9. *Aponogeton leptostachyum*. For. sp.; spec. 1, coll. in East Africa.

10. *A. monostachyum*, L. For. sp. (*Saururus natans*, L.) A fine spec. in fruit from Ceylon. The fruit is on a long crowded spike, as in *Saururus*.

11. *A. distachyum*, Thunb. For. sp.; spec. 2; from Edinburgh Bot. Garden.

12. *Ouvirandra fenestralis*, Thomas. For. sp.; one spec. from Madagascar of this curious plant, consisting of two of the skeleton leaves by which it is distinguished.

The tribe POTAMEÆ is represented by its two genera, *Potamogeton* and *Ruppia*.

13. * *Potamogeton acutifolius*, Link. For. sp.; one spec, England, coll. and com., Mr. A. Bennett, of Croydon. This sp. is very similar to *P. zosterifolius*, Schum.

14. *P. amplifolius*, Tuckerm. Spec. 11; N. J., N. Y., N. Eng., Lake Superior, Ky. *Also spec. Ex. Herb. Dr. Robbins.

15. *P. Claytoni*, Tuckerm. Spec. from N. Eng., N. Y., N. J., S. C. *Spec., Ex. Herb. Dr. Robbins.

16. *P. crispus*, L. Spec. 8; Am., from N. J.; for., from Gr. Brit., Cont. Eu., Loo Choo Is., India.

Var. *serratus*, Huds. (labelled *P. serrulatus*, Schr.) Spec. 1, sent by Nolte from Schleswig-Holstein. This is merely a form, not a true variety.

17. * *P. decipiens*, Nolte. For. sp.; spec. from Sweden, coll. and com., Dr. G. Tiselius, of Stockholm.

18. *P. densus*, L., (*P. oppositifolium*, DC.) For. sp., spec. 3; Eu.

19. *P. fluitans*, Roth. For. sp.; spec. 4; Cuba, Eu. and Africa.

20. * *P. gemmiparus*, Robbins, in Herb., (*P. pusillus*, L., var. (?) *gemmiparus*, Robbins in Gray's Manual); type spec. Ex. Herb. Dr. Robbins.

21. *P. gramineus*, L. (*P. heterophyllus*, Schreb.) Spec. 12; Am., N. Eng., N. Y., N. J., Nevada; for., Gr. Brit. France.

I include in this the so-called varieties, *heterophyllus* and *graminifolius*. *Also spec. of the type form and varieties, Ex. Herb. Dr. Robbins.

* Var. (?) *spathulæformis*, Robbins, of Gray's Man.; type spec., Ex. Herb. Robbins, coll. in Fresh Pond, Cambridge, Mass. This was at first called *P. spathæformis* by Tuckerman. I consider it only a form of *P. Zizii*, M. and K.

Var. *maximus*, Morong. Two spec. contributed by Prof. Tuckerman, and marked by him *P. lonchites*; and also one spec. contributed by Prof. Porter, under the name *P. rufescens*, are both, in my opinion, *P. gramineus*, L., var. *maximus*, mihi.

22. *P. Hillii*, Morong. One spec. from N. Y., coll. W. H. Leggett, and one spec. from Mich, coll. E. J. Hill.

23. *P. hybridus*, Michx. Spec, 18; from N. Eng. to N. Mex.; * one spec. Ex. Herb. Dr. Robbins.

24. * *P. Illinoensis*, Morong. Spec. coll. R. I. Cratty, in Iowa, and H. N. Patterson, in Illinois.

25. * *P. lanceolatus*, Sm. Spec. from England, coll. Mr. A. Bennett, of Croydon. A sp. peculiar to Gr. Brit., not yet found in fruit.

26. *P. lonchites*, Tuckerman. For the present this sp. is allowed to retain the name by which it has been known in this country ever since it was described by Tuckerman in Silliman's Journal thirty-seven years ago; but I am quite satisfied that it is

the same as the European *P. fluitans*, Roth., an earlier name, and running with us into several peculiar forms.

Spec. 4; Am., from N. J., Ky. and Cal.

27. *P. lucens*, L. Spec. 6; one from Am., with no locality marked; one from Cuba and four from Eu.; all excellent spec.

28. *P. marinus*, L., (*P. filiformis*, Pers.) Spec. 5; one from the Yellowstone Park, *one from Lake Seneca, N. Y., one from Mich. and two from Eu.

Var. (?) *occidentalis*, Robbins. Two spec. from Utah and Nevada, from the original spec. on which Robbins founded the variety.

29. *P. mucronatus*, Schrad. (*P. pusillus*, L.; var, *major*, Fries.) Spec. 2; both from Eu. * One spec. from Lake Seneca, N. Y.

30. *P. natans*, L. Spec. 10; Am., from N. J. to the Pacific Coast. * Spec., Ex. Herb. Dr. Robbins; for., Cont. Eu. There are also two doubtful forms; one from the Corean Archipelago, and one from India, coll. Hook. fil. and Thomson, which are labelled *P. natans*, having small elliptical leaves, and which may be forms of this species, but fruit is lacking to settle the matter.

* Var. *prolixus*, Koch. One spec. Ex. Herb. Dr. Robbins. A mere form growing in swiftly running water.

P. Niagarensis, Tuckerm., vid. *P. pauciflorus.*

31. *P. nitens*, Webber, labelled "*P. curvifolium*," but *P. curvifolius*, Hartm., is only a form of *P. nitens*, Web. For. sp.; one spec. from Eu. This spec. is a very fine one with floating leaves and good fruit, neither very common with this sp.

32. *P. Oakesianus*, Robbins. Spec. 4; N. J; * type spec. Ex. Herb. Dr. Robbins.

33. *P. obtusifolius*, M. and K. Spec. 3; all for., France and Gr. Brit.; * one spec. from Sweden and others Ex. Herb. Dr. Robbins.

34. *P. ochreatus*, Raoul. Spec. from New Zealand, where alone the sp. occurs.

35. *P. pauciflorus*, Pursh. Spec. 19; N. Eng. to N. Mex.; * spec. Ex. Herb. Dr. Robbins.

Var. *Niagarensis*, Gray, (*P. Niagarensis*, Tuckerm.) Type spec. from Prof. Tuckerman, coll. at Niagara Falls, but destitute of flowers or fruit. Before his death, Dr. Robbins told me that he had become convinced that this should be marked as a variety of *pauciflorus*, and in that opinion I fully concur.

36. *P. pectinatus*, L. Spec. 20; Am., N. Eng. to N. Mex. and Oregon; for., from Gr. Brit., Cont. Eu., India and Brazil; * spec., Ex. Herb. Robbins.

Var. (?) *latifolius*, Robbins. One of orig. spec. on which Robbins founded the var. It is very similar to, if not the same as *P. flabellatus*, Bab.

37. *P. perfoliatus*, L. Spec. 15; Am., from N. J. and Del. to Wis.; for., from Gr. Brit. and Germany; * one spec. Ex. Herb. Dr. Robbins.

Var. *lanceolatus*, Robbins. Spec. 4.; N. J., Nevada, Pacific Coast; * type spec. Ex. Herb. Dr. Robbins.

38. *P. plantagineus*, Du Croz. For. sp.; spec. 2, Germany.

39. *P. polygonifolius*, Pourr. For. sp.; spec. 1, from Gr. Brit.

40. *P. prælongus*, Wulf. Spec. 3; Am., Mass.; for., Eu.; * spec. from Sweden, coll. Dr. Tiselius, and Ex. Herb. Dr. Robbins.

41. *P. pulcher*, Tuckerm. Spec. 4; one of the spec. contributed by Prof. Tuckerman, from Spot Pond, Stoneham, Mass., the locality in which it was first found, without flower or fruit, however; * spec. Ex. Herb. Dr. Robbins.

42. *P. pusillus*, L., (including var. *tenuissimus*, M. and K.) Spec. 23; Am., from N. J. to Utah and Brit. Am.; for., Abyssinia; * spec. Ex. Herb. Dr. Robbins.

43. *P. Robbinsii*, Oakes. Spec. 5; N. Eng., Pa., Pacific Coast; * type spec., Ex. Herb. Robbins.

44. *P. rufescens*, Schrad. Spec. 11; Am., from N. J., N. Y.; for., Germany, * Sweden.

* Forma *rivularis*, Sond. One spec.; Sweden, com. Dr. G. Tiselius.

45. * *P. rutilus*, Wolfg., (*P. cæspitosus*, Nolte.) For. sp.; from Sweden, com. Dr. G. Tiselius.

46. *P. Spirillus*, Tuckerm. Spec. 10; N. Eng., N. J. Among these are type spec. from Tuckerman, and from Herb. Chapman; doubtless given to Chapman by Tuckerman or Robbins; * spec. Ex. Herb. Robbins.

P. striatus. A spec. so labelled, from Chili, S. A., is not the real *P. striatus*, Ruiz. et Pavon., but *P. pusillus*, L.

47. *P. tenuicaulis*, F. Müller. Two excellent spec. of this rare Australian sp., one from Formosa, coll. Oldham, and the other from India, coll. Hook. fil. and Thomson.

48. *P. trichoides*, Cham. For. sp.; one excellent spec. from Eu.

49. *P. Tuckermani*, Robbins. Spec. 5; N. J., N. Y. N. Eng.; *type spec. Ex. Herb. Dr. Robbins.

50. *P. variifolius*, Thore. For. sp.; spec. 1, France.

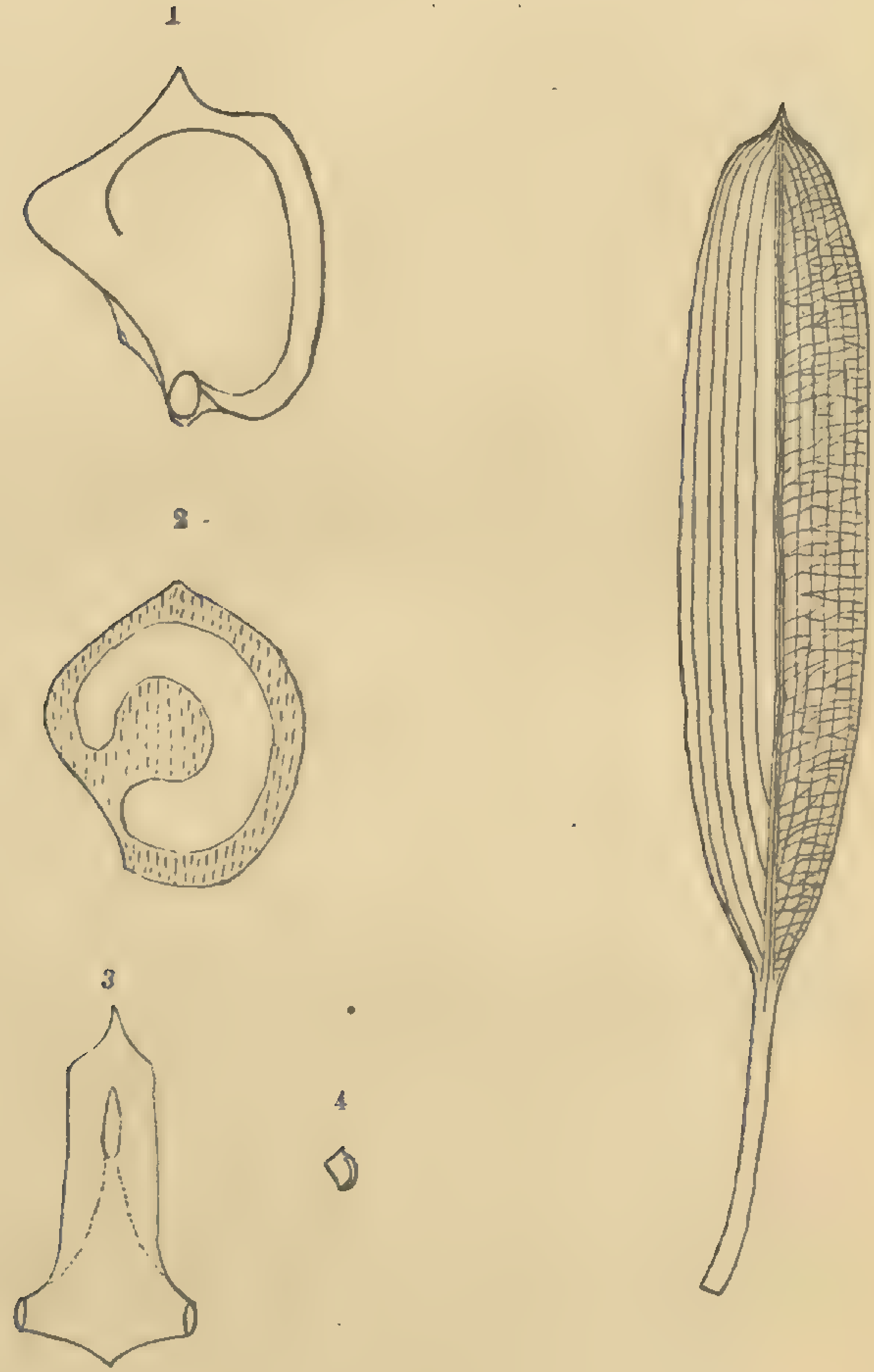
51. **P. Vaseyi*, Robbins. Spec. from N. Eng. and Canada.

52 P. WRIGHTII, n. s. Leaves all submerged, alternate, the blade elliptical, the largest 4½ inches long, 4 or 5 lines broad at the widest part, tapering into a petiole 1½ inches in length, and abruptly acute or acuminate at the apex, the midrib thick and compound, with 5 or 6 lateral nerves on each side, margins entire, cross veins numerous and sloping slightly upwards; stipules scarious, obtuse, 1 to 2 inches long; peduncles clustered at the top of the stem, slightly thickened upwards, 1½ to 1¾ inches in length; spikes 1 to 2 inches long, narrow cylindrical, the fruit crowded; nutlets obovate, about 1½ lines long by 1¼ lines wide, three-keeled on the back, with a remarkable projection or hump on the upper part of the face, and two lateral teeth or processes at the base (vid. figures 1 and 3 in the plate), the sides flattened; style short, apical; apex of the embryo pointing directly towards its base. PLATE LIX.

Collected by C. Wright at the Loo Choo Islands, in the Exp. of Ringgold and Rodgers, in 1853-6.

The plant is without roots, the fragment being about 16 inches high. A similar specimen is in the Herb. of Dr. Asa Gray at Cambridge. In the Torrey Herb. it is labelled *P. rufescens*, Schrad., but it is essentially different from that sp., though bearing a general resemblance to it. *P. rufescens* has leaves obtuse at the apex, while here they terminate abruptly in an acute or acuminate point; and in this sp. the cross-veining is much closer. The fruit, however, forms the most remarkable feature of Wright's plant, being totally unlike that of *rufescens*, or of any other sp. with which I am acquainted.

Bulletin Torrey Botanical Club. Plate LIX.



Potamogeton Wrightii, Morong.

53. *P. Zizii*, M. and K., (*P. lucens*, L., var. *minor*, Nolte.) Spec. 6; Am., N. J., Fla., N. Mex.; for., from Germany and Switzerland. A spec. contributed by Prof. Porter has unusually fine floating leaves and fruit.

54. *P. zosterifolius*, Schum., (*P. compressus*, Fries. non L.) Spec. 5; Am., N. J., N. Y.; for., Eu.; *spec. Ex. Herb. Robbins.

55. *Ruppia maritima*, L. Spec. 16; Am., N. J. and N. Y. to N. Mex.; for., Cuba, Eu., Tasmania and India.

R. rostrata, Agardh., (probably *R. rostellata*, Koch.) of which there is a spec., is not essentially different from *R. maritima*.

The POSIDONEÆ are represented by *Posidonia*.

56. *P. oceanica*, Kœnig. For. sp.; one spec. from Mauritius. (*P. Caulini*, Kœnig.; *Caulinia oceanica*, Cand.; *Zostera oceanica*, L.)

Of the ZANNICHELLIÆ there are *Zannichellia* and *Althenia*.

57. *Zannichellia palustris*, L. Spec., 18; Am., N. Y., Fla. to Ind. Terr. and N. W. coast; for., France, India.

Z. polycarpa, Nolte. A spec. of this contributed by Nolte himself from Schleswig-Holstein; not essentially different from *Z. palustris*.

58. Z. INDICA. A delicate form from the Loo Choo Is., under the label "*Z. Indica*, Cham." I cannot find that Chamisso ever published any such sp., and think it must be wrongly referred; nor can I learn who is the authority for the name.

Stem capillary; leaves less than ⅖ mm. broad; fruit in clusters of 2 and 3, the clusters sessile, the nutlets about 2 mm. long, winged or toothed on the back, otherwise smooth, on pedicels 3 or 4 mm. long; styles as long as the pedicels; stigmas peltate, in the dried spec. looking very thin and scarious. The thread-like stems and leaves, small fruit and long capillary pedicels and styles, mark this as a distinct sp. Collected C. Wright in Expd. Ringgold and Rodgers, 1853-6.

59. *Althenia filiformis*, Petit. For. sp.; spec. 2, France. (*A. setacea*, Petit; *Belvalia australis*, Del.; *Zannichellia australis*, Del.)

Of the ZOSTEREÆ the Herb. contains *Zostera* and *Phyllospadix*.

60. *Zostera marina*, L. Spec. 6; Amer., Mass. to Key West and California; for., France, Italy.

Var. (?) LATIFOLIA. A spec. coll. by Dr. Antisell on the beach at Santa Barbara, Cal. There are spec. of the same thing in Herb. Gray at Cambridge, Mass., sent by Mrs. R. F. Bingham from Santa Barbara, and by Prof. Farlow from Monterey, by means of which I am able to make the following analysis; leaves 5 to 12 mm. wide, ten to thirteen-nerved, with 7 or 8 striae between the nerves; pist. flower with an ovary 4 mm., and a style 3 mm. long; fruit costate, 4 to 5 mm. long by 3 mm. in diam., ribs about 25. The fruit, and indeed, the whole plant every way, is much larger than the common eastern form of *Z. marina*, which has a nutlet 2½ to 3 mm. long, and about 1½ mm. in diam., and leaves 3 to 4 mm. wide, and three and five-nerved. The California plant resembles an abnormal form from the river Auray, France, a spec. of which is in Herb. Gray, but without flower or fruit.

61. *Z. nana*, Roth., (*Z. minor*, Nolte.) Spec. 2; for., Schleswig and Belgium. A spec. from Key West, Fla., coll. Blodgett, also appears to be this spec., but as it has no flowers or fruit, we cannot be certain. The fruit differs from that of *Z. marina* in being perfectly smooth.

62. *Phyllospadix Torreyi*, Watson. Spec. sent by Mrs. R. F. Bingham from Santa Barbara, Cal.

The tribe NAIADEÆ is represented by *Naias*.

63. *N. flexilis*, Rostk. et Schmidt. Spec. from Mass., N. Y., N. J., also Ex. Herb. Chapman labelled "Northern States."

64. *N. microdon*, A. Br. Spec. from Cuba, coll. C. Wright, No. 605. These are probably of the type spec. sent by Wright to Braun, and described by him in a paper read before the Nat. Hist. Soc. at Berlin, June 16, 1868. Spec. from Nicaragua, coll. C. Wright, in Exp. Ringgold and Rodgers, and labelled "*Caulinia flexilis*." Other spec. are from Monterey, and probably this sp. from Chapman, Fla., labelled "*Caulinia fragilis*," and from Hale, Louisiana, labelled "*N. flexilis*." * One spec. from Texas, coll. J. Reverchon.

Var. *Guadalupensis*, A. Br. C. Wright's Cuban coll. 3717, one spec.

"*N. flexilis*, var. (?) *fusiformis*, Chap." The original spec. is in the Herb., but it is the same as *N. microdon*, A. Br. In our lowest tier of States and throughout Mexico this sp. seems generally to take the place of *N. flexilis*.

65. *N. Wrightii*, A. Br. Several spec., C. Wright's Cuban coll. 3716. Two forms of this, both in the Herb., and both under the same number; the one chosen by Braun as the type, dense and bushy, leaves about ½ mm. wide, and marginal teeth stout, many-celled at base, and about one half as long as the breadth of the leaf; the other called by Braun var. *laxa*, which has a lax, open form, with broader leaves, and often rather smaller teeth.

66. *N. arguta*, H. B. K. Two spec. of Wright's Cuban coll. 3715 under this name, not the type, as one of them is marked, but *N. arguta*. var. *conferta*, A. Br. (Seeman's Jour. of Bot. ii, 274) afterwards changed by Braun, in a paper read before the Berlin Nat. Hist. Soc., June 16, 1868 to *N. conferta*. Braun.

67. *N. Indica*, Cham. For. sp. (*N. minor*, var. *Indica* A. Br.; *Caulinia Indica*, Willd.)

There is a spec. of this in the Herb. without locality or name of collector, but as it is mounted on a sheet with a spec. of *N. graminea*, Del., from the East Indies, I suppose we may assume that it came from India. There are several forms both in Herb. Torrey and Herb. Gray that are labelled *N. Indica*, but this is the only one which I feel sure is that species, and this unfortunately is a mere fruitless fragment.

Var. *gracillima*, A. Br. (See Gray's Man., fifth Ed. Supp.) Spec. from Albany, coll. C. H. Peck, are in the Herb. under the name of "*N. minor*, var. *tenuissima*, A. Br.," with which it has been sometimes confounded; and also spec. from N. J. It is not an uncommon form in our country.

68. *N. marina*, L., (*N. major*, All.) Spec. 8; four of them marked *N. monosperma*, Willd., a syn.; one from Cuba, Wright's coll. 3718, one from Central N. Y., and one from Utah.

Var. *gracilis*, Morong. One spec., Florida, Curtiss coll., 2705.

69. *N. muricata*, Del. One spec. from Egypt. This sp. is distinguished from *N. marina* by having the internodes and leaf-blades densely crowded with large teeth, which are longer than the breadth of the leaf.

70. *N. graminea*, Del. One spec. from the East Indies labelled "*N. Indica*, Cham." The fruit is somewhat smaller than that of the original plant from Africa.

CYMODOCEÆ is represented by *Cymodocea* and *Halodule*.

71. *Cymodocea æquorea*. Kœnig. One spec. from India; another spec. so marked is doubtful.

72. *C. manatorum*, Asch. Spec. 1, Cuban coll. C. Wright, No. 3719.

73. *Halodule Wrightii*, Asch. Wright's Cuban coll., 3720. By some *Halodule* is regarded as only a sub-genus of *Cymodocea*. Neither has so far been found on our coast, but Cuba is so near that we may look for *Halodule* in our Southern waters.

EXPLANATION OF PLATE LIX.

Fig. 1. Side view of undenuded nutlet of *Potamogeton Wrightii*, Morong., × 12.

Fig. 2. Nutlet split open, showing embryo, × 12.

Fig. 3. Front view of nutlet, showing the lateral basal processes, × 12.

Fig. 4. Nutlet, × 1½.

Fig. 5. Leaf, natural size.

Synopsis of the Genus Paspalum.

BY DR. GEO. VASEY.

SECTION ANASTROPHUS, BENTH.

Spikelets rather distichous than secund, with the back of the flowering glume turned *outwards* or away from the rhachis.

1. *P. platycaule*, Poir.—Culms very slender, 6–18 inches high from a creeping rhizoma, peduncle long exerted, terminated by a pair of spikes (1 to 2 inches long) or 3 or 4 approximate slender spikes, and frequently with several long-peduncled lateral ones; spikelets single, elliptical-oblong, acutish or obtuse, outer glumes little longer than the flower, generally only two-nerved; leaves narrowly linear, smooth, obtuse, the sheaths much compressed.

2. *P. Michauxianum*, Kth. (*P. Digitaria*, Chap. non Poir.)—Larger and more robust; culms 1 to 2 feet high; leaves 3 to 6 inches long, wide, obtuse, smooth or hairy; sheaths compressed; spikes about 3, 2 to 4 inches long; spikelets rather distant, about

2 lines long; outer glumes lanceolate, acute, five to seven-nerved, one-third longer than the flowering glume.

Var. VILLOSUM; leaves and sheaths very villous.

SECTION EUPASPALUM, BENTH.

Spikelets more or less secund along the rhachis, with the back of the flowering glume turned *inwards* or toward the rhachis.

Subsection CERESIA, Benth.

Rhachis of the spikes membranaceous, dilated and applied close to, and nearly enclosing the flowers when mature.

3. *P. fluitans*, Kth.—Culms 1 to 3 feet long, from a creeping or floating rhizoma; leaves flat, broad linear; spikes numerous (40 to 50), alternate and verticillate, divaricate, slender, 2 to 2½ inches long; spikelets in two rows, ½ line long, oblong, pubescent.

Subsection OPISTHION, Benth.

Rhachis of the spikes flat, not dilated.

(*a.*) *Spikes digitate, in terminal pairs, or rarely* 3 *or* 4.

4. *P. conjugatum*, Berg.—Spikes divaricate, 2 to 5 inches long; spikelets very numerous (25 to 30 to the inch), secund, ovate, *rather acute*, hardly a line long, sterile glumes ciliate on the margins.

5. *P. notatum*, Flugge.—Culms rather stout; spikes thick, 2 to 3½ inches long, erect-spreading; spikelets ovate, *obtuse*, 1½ lines long, smooth, five-nerved.

6. *P. distichum*, Linn.—Culms erect from a creeping rhizoma, 6 inches to 2 feet high; leaves lanceolate, acute, *flat*, 2 to 3 lines wide; spikes little spreading, 1 to 2 inches long, not as thick as in *P. notatum;* spikelets oblong, acute or acutish, smooth, about 10 pairs to the inch.

7. *P. vaginatum*, Swz.—Culms from stout, creeping rootstocks, in wet ground or water, very leafy; leaves distichous, involute and pointed; sheaths loose; spikes 1 to 3 inches long, erect or spreading; spikelets oblong-lanceolate, acute, smooth; sterile glumes very *thin*, three to five-nerved, the lower *without midrib*. This species is united with the preceding by Bentham.

(*b.*) *Spikes single and terminal, or one terminal and one (rarely more) additional, approximate, with sometimes axillary peduncled ones.*

8. *P. monostachyum*, Vasey in Chapm. Suppl. to Southern Flora.—Culm with spike 2 to 3 feet high, both rigidly erect;

spike 6 to 8 inches long; spikelets in pairs, very close, smooth, about 1½ lines long, oblong, obtusish; occasionally with a long peduncled axillary spike, and sometimes the spikelets with a third small sterile glume.

9. *P. setaceum*, Michx. (*P. debile*, Michx.)—Culms 1 to 1½ feet high, very slender; spikes long exerted, about 3 inches long and slender; spikelets in two rows, about ¾ inch long, very close; leaves narrow.

10. *P. ciliatifolium*, Muhl.—(*P. dasyphyllum*, Ell.)—Culms stouter, 1½ to 2 feet high; leaves mostly longer and wider, smooth or hairy; spikes thicker; spikelets generally larger, and in two or three rows.

(*c*). *Spikes* 2 *to* 5, *rarely more, not digitate.*

* Spikelets 1 line long or less.

11. *P. cæspitosum*, Flugge.—Culms 1½ to 2 feet high, simple, leafy below; spikes 2 to 4, about 1 inch distant, 1 to 1½ inches long, closely flowered; spikelets about half a line long, elliptical, minutely pubescent.

Var. LONGIFOLIUM, leaves smooth much longer and narrower.

12. *P. Walterianum*, Schultes.—Culms decumbent from a creeping rootstock, much branched; 1 to 2 feet long, smooth; leaves 3 to 4 inches long, acute, sheaths loose, the upper enclosing the lower spike; spikes 3 or more, approximate, with many from the lateral branches, 1 to 1½ inches long; spikelets in two rows, ovate, 1 line long, smooth; rhachis broadly winged, the margins partly covering the spikelets.

13. *P. lentiginosum*, Presl.—Culms 2 to 3 feet high, often branching below, joints smooth; sheaths long and loose; leaves 4 to 8 inches long, about ½ inch wide; panicle 3 to 5 inches long; spikes 3 to 5, alternate, ¾ inch to 1½ inches apart, the lower ones 3 to 4 inches long, upper shorter; rachis subflexuous, very narrow; spikelets about a line long, in pairs, broadly oval; sterile glumes slightly puberulent, minutely punctate and brown spotted; generally with a minute third sterile glume as in *Panicum*, (350 Drummond, Texas.)

* * Spikelets from 1 to 1½ lines long.

14. *P. lividum*, Trin.—Culms 2 feet or more high, branching below, smooth; panicle about 4 inches long; spikes 4 to 5,

alternate, slightly spreading, 1 to 1½ inches long; rhachis narrow, straight; spikelets in four rows, a little more than 1 line long, oval, acutish, smooth, *pale green;* sterile glumes three-nerved, a little longer than the flowering ones. (867 E. Hall, Texas.)

15. *P. præcox*, Walt. (*P. lentiferum*, Lam. ?.)—Culms 2 to 3 feet high, simple, smooth; leaves long and narrow, smooth, or hairy below; panicle long exerted, 4 to 5 inches long; spikes 3 to 6, 1½ to 2 inches long; rhachis straight and flat; spikelets in three or four rows, nearly orbicular, obtuse, 1 to 1½ lines long; sterile glumes smooth, three-nerved.

Var. CURTISIANUM (*P. Curtisianum*, Steudel.), larger and stouter, spikes 6 to 8, spikelets large, leaves and sheaths hairy.

16. *P. læve*, Michx.—Culms 2 to 4 feet high, simple; panicle 3 to 6 inches long; spikes 3 to 5, rather slender, 2 to 4 inches long; rhachis narrow and flexuous; spikelets single in two rows, about 1½ lines long, oval or nearly orbicular, smooth; sterile glumes smooth, five-nerved, (two very near the margin.)

Var. UNDULOSUM (*P. undulosum*, Le Conte), leaves flat, 4 to 6 inches long, 4 to 5 lines wide, the margins undulate.

Var. ANGUSTIFOLIUM, (*P. angustifolium*, Le Conte), leaves 6 to 10 inches long, narrow, spikes usually longer.

17. *P. plicatulum*, Michx.—Culms 2 to 3 feet high, rather slender, smooth, simple; panicle 3 to 5 inches long; spikes 1½ to 3 inches long, rather slender; rhachis narrow, flexuous; spikelets in pairs, rather lax, forming 2 or 3 series, smooth, oval or obovate-elliptical, obtuse; sterile glumes about five-nerved, the second or flat one when mature with 2 to 3 transverse plications on each side near the margin; flowering glume brownish purple.

18. *P. remotum*, Remy. (?) (*P. Hallii*, V. & S.)—Culms 2 to 3 feet high, rooting at the lower joints and branching below, the nodes pubescent; panicle 3 to 4 inches long; spikes 3 to 6, approximate, rather thick, 1½ to 2½ inches long; rhachis wide, nearly straight; spikelets mostly in four rows, 1 to 1½ lines long, ovate or oval, obtuse; sterile spikelets about five-nerved, pubescent, or nearly smooth. (804 E. Hall, Texas.)

Var. *glaucum*, Scribner.—Culms erect and more rigid, spikes 5 to 7, spikelets more elliptical.

Var. GLABRUM.—Culms decumbent and rooting at the base, spikelets smooth or nearly so.

19. *P. racemulosum*, Nutt.—Culms erect, 2 to 3 feet high, simple; leaves long, the lower ones with the sheaths white-hairy; panicle erect, 4 to 6 inches long; spikes generally 3, lax, few-flowered, 3 to 4 inches long; rhachis narrow and flexuous, spikelets in alternate pairs, distant, distinctly pedicelled, oblong-ovate, obtuse, about 1 ½ lines long; sterile glumes smooth, seven-nerved.

20. *P. dilatatum*, Poir., (*P. ovatum*, Trin.)—Culms 3 to 4 feet high, simple, smooth; leaves lance-linear, acuminate, smooth; panicle 6 to 8 inches long, lax, cernuous; spikes 3 to 7, rarely more, 2 to 4 inches long, gradually shorter upwards, rather lax; rhachis smooth and straight; spikelets in four rows, compressed, ovate, acute; sterile glumes about 1 ½ lines long, acute, five-nerved, longer than the obtuse flowering ones, the lower one with scattered silky hairs, especially on the margins.

Var. DECUMBENS; culms shorter and decumbent, the spikes usually 3 or 4.

* * * Spikelets larger, 1½ to 2 lines long.

21. *P. difforme*, Le Conte.—Culms erect, 2 to 3 feet high, simple, leafy near the base; leaves 4 to 6 inches long, about 4 lines wide, flat, upper surface and margins with scattered long hairs, which disappear with age, upper leaves very short; panicle short, of 2 or 3 rather dense spikes, 1 ½ to 3 inches long; rhachis narrow aud flexuous; spikelets mostly single and in two rows, oval-oblong, obtuse, 1 ½ to nearly 2 lines long; lower sterile glume slightly scabrous, five-nerved. Intermediate between *P. læve* and *P. Floridanum.* (3,570, A. H. Curtiss distribution.)

22. *P. Floridanum*, Michx.—Culms erect, rigid, simple, tall; leaves long and narrow, hairy or smooth; spikes 2 to 6, thick, erect, 3 to 5 inches long; rhachis narrow and flexuous; spikelets in two to four rows, about 2 lines long, smooth, obtuse, ovate, three to five-nerved, finely reticulate-striate.

Var. TYPICA; leaves and sheaths rough hairy, spikes 2 to 3.

Var. *glabrata*, Englm.; leaves smooth, wider, spikes more numerous, usually 5 to 7.

23. *P. giganteum*, Baldw. (ined.)—Culms simple, erect, 3 to 5 feet high; leaves long and wide, the lower 18 inches long, and

nearly an inch wide; spikes 3 to 4, about 2 inches distant, spreading and becoming widely divergent, 5 to 8 inches long, and rigid; rhachis nearly straight; spikelets crowded, mostly in two rows, about two lines long, ovate, obtuse, smooth; sterile glumes five-nerved.

(*d.*) *Spikes more numerous—7 to 20.*

24. *P. purpurascens*, Ell.—Culms decumbent and ascending, 2 feet high, branching, glabrous; leaves long and rather broad, glabrous, or hairy near the base, more or less of a purplish hue, as are also the lower joints of the stem; panicle 4 to 6 inches long; spikes variable in number, 5 to 7, sometimes 10 to 12, rarely on poor specimens, or on the branches, 3 or 4, 2 to 3 inches long, closely flowered; rhachis straight, wide; spikelets mostly in four rows, crowded, about 1 line long, obovate, obtuse; sterile glumes five-nerved, smooth, of a livid hue; flowering glume becoming black.

25. *P. virgatum*, L., var. PUBIFLORUM.—Culms tall and stout, 3 to 4 feet high, smooth; leaves long and narrow, smooth, hairy at the throat, joints dark; panicle 6 to 9 inches long, virgate; spikes 12 to 25, erect and appressed, semi-verticillate, flexuous, the lower 3 to 4 inches long, diminishing upwardly; rhachis narrow, straight; spikelets about 1½ lines long, acute, ovate, in four rows; sterile glumes white-hairy, especially on the margins, longer than the obtuse flowering glume.

SPECIES LITTLE KNOWN.

26. *P. elatum*, Richard —Culms erect, sub-compressed, striate, glabrous; sheaths and leaves glabrous, the leaves linear, elongated, narrowly acuminate; spikes 5 to 7, sub-fasiculate, sessile, approximate, erect, or subfalcate spreading, elongated; spikelets in twos, short-pedicelled, narrowly obovate, twice as wide as the axis; glumes obovate, five-nerved, smooth. In Herb. Gray is a specimen from Key West, and another from Texas, (No. 364 Drummond.) The description is from Doell's Gram. Bras.

27. P. BUCKLEYANUM—Culms decumbent at the base, simple, 2 to 3 feet high, smooth; leaves long and narrow, conduplicate; panicle 7 inches long, erect; spikes 6, alternate, erect or little spreading, 1 to 1½ inches distant, the lower nearly 3 inches

long, upper 1½ inches; rhachis straight; spikelets pale, in four rows, crowded, elliptical-oblong, acute, nearly 1½ lines long; sterile glumes sparingly pubescent, three to five-nerved. This is described from a single specimen collected by Dr. Buckley in Texas. It is nearest to *P. lividum*, from which it differs in its longer panicle, with more numerous, longer and more distant spikes, and in the form and pubescence of the spikelets.

The Dehiscence of Fern Sporangia.

An easy and convenient method of studying the interesting process of the bursting of the sporangium in ferns is the following:

Place some sporangia from a mature sorus of any of the Polypodiaceæ (an herbanium specimen will do) in a drop of water on a slide and cover with a thin cover glass. The dehiscent sporangia will soon close; now examine their structure, especially the cells forming the annulus. Notice that their outer peripheral walls are much thinner than the inner and radial ones. Apply a drop of glycerine, chloriodide of zinc or sulphuric acid to one edge of the cover glass, and draw off the water by a piece of blotting paper at the opposite edge. While the water is slowly displaced by the reagent, concentrate the attention on the cells of the annulus; observe that the radial walls gradually approach each other, while the outer curve inward and finally double up. This decreases the size of the cells, and hence the length of the outer curve of the annulus; the latter gradually becomes straight, and finally recurved, so that the ends often touch one another. The tension exerted on the thin-walled portion of the sporangium by the straightening of the annulus has, meanwhile, caused it to burst. Suddenly, however, the cells of the annulus resume their former shape, it at once becomes straight, and the sporangium slowly assumes the shape which it had before it was placed in the water. If the cells of the annulus be now examined, it will be noticed that each contains an air-bubble almost entirely filling its cavity. If the reagent be replaced by water the bubbles will become globular, grow smaller and smaller and finally disappear. At the same time the annulus cells expand to their full size, the sporangium closes entirely and is now in the condition in which it was at the beginning of the experiment; moreover, it will repeat this performance as often as desired.

The most curious phenomenon of all, the sudden appearance of the air-bubbles in the cells of the annulus, causing the jerking motion by which the spores are scattered, is explained by Prantl * in the following manner:

The interior of the cells of the annulus is lined with a continuous layer of protoplasm which is thickest along the inner, thinner along the radial, and quite thin at the outer walls. This layer can be demonstrated by treating with chloriodide of zinc. (I obtain better results by using a concentrated solution of sugar and sulphuric acid). It must be assumed that this protoplasm, or rather some unknown substance contained in it, absorbs water through the cell-wall, with great avidity and force, while there is no plasmolysis, i.e., the cell-membrane does not permit the water-absorbing substance to pass out of the cell. There will be, consequently, great endosmotic pressure exerted on the contents of the cell, and the air which is present in it will, under this pressure, be absorbed by the water. On the other hand, if, by using glycerine, or similarly acting reagents, the water is abstracted from the cells, the first effect is that their space is diminished, the outer wall gives way, and folds up inward, etc., but as soon as the endosmotic pressure is diminished so that a certain limit is reached, the air which had been absorbed will suddenly be liberated, and the volume of the cell increased correspondingly.

In the living plant, the bursting of the sporangia and the scattering of the spores must be explained in the same way, viz.: by the gradual disappearance of the water from the cells of the drying annulus.

JOSEPH SCHRENK.

Botany at the Buffalo Meeting

OF THE

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE,

AUG. 18TH-24TH, 1886.

The Botanical Club met at 9 A.M., Thursday, Aug. 19th, and held three subsequent meetings, Prof. J. M. Coulter in the chair; Dr. J. C. Arthur, Secretary. Owing to duties as Secretary of

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* Berichte d. Deutschen Bot. Gesell., iv., p. 42.

the Biological Section, Prof. Arthur resigned and Dr. N. L. Britton was elected in his place.

A letter was read from Dr. Asa Gray, conveying a revision of the genus *Dodecatheon*, in which he recognizes five species, differing in this from his conclusion, in the last edition of Vol. ii, Syn. Flor. N. A., where all the forms were considered as varieties of *D. Meadia*. The present classification is based on characters of the capsules.

Prof. E. W. Claypole presented some notes on the action of the Potato Rot fungus (*Peronospora infestaus*) on the tubers, stating that the mycelium enters at the eyes, where the vascular system reaches the surface, penetrates and destroys it, but leaves the starch-cells intact. Subsequently *Bacterium termo* attacks the latter. The so-called "resting-spores" of *Peronospora* were shown under the microscope.

Prof. F. Lamson Scribner described and illustrated his method of making drawings of minute portions of plants. The apparatus used consists of a Zentmayer dissecting microscope, with the metal base replaced by a wooden one, which slides in a frame hinged to a heavy base board. When in use, the frame is placed vertically and the focal distance adjusted as desired. A Wollaston camera and an adaptor for lenses are attached; drawings are made on tracing paper and transferred by means of a steel point to Bristol board. The final lines are inked with Keuffel & Esser's pen No. 1459. Remarks were made by Prof. Burrill and Dr. Beal.

Dr. W. J. Beal exhibited a cheap and convenient tray to contain the apparatus used by students in laboratory work, and invited criticism. Dr. Farlow remarked on the danger to lenses from the proximity of reagents. Prof. J. H. Pillsbury advocated the use of a board with holes and grooves.

W. H. Seaman read a paper on the occurrence of *Marsilea quadrifolia* in the fish ponds at Washington. (See BULLETIN, xiii, p. 144.) Dr. Beal stated that it had spread extensively in Michigan. Rev. Thos. Monong said that it was now abundant in Concord River, Mass., extending along its banks for miles, to the exclusion of other aquatic plants, being almost as objectionable as *Anacharis* is in Europe. It all appears to have originated from the station at Bantam Lake, Conn. In reply to a question from Prof. Underwood, Mr. Morong suggested as a possible explanation for its distribution, the influence of aquatic birds, and cited as a similar case the occurrence of *Potamogeton crispus* in Arizona.

Prof. Lucien M. Underwood reported the receipt of *Salvinia natans* from Dr. Demetrio in Central Missouri, and referred to Pursh's statement that it was found in Western New York, but stated that it has not since been collected there. .

FRIDAY, AUG. 20TH.

F. V. Coville read a paper on the occurrence of *Aconitum Noveboracense*, Gray, n. sp., near Oxford, N. Y.

Prof. T. J. Burrill described some home-made apparatus for the investigation of bacteria.

Mr. Morong exhibited *Potamogeton fluitaus* from the Niagara River, where it is abundant, and stated that *P. lonchites*, Tuck., is closely allied, if not identical.

Miss Lillie J. Martin read a paper on Petroleum Spirit (boiling 25°-45° C.) as a preservative of the chemical constituents of plants. The subject was discussed by Professors Seaman and Barnes.

B. E. Fernow exhibited specimens of the chestnut bearing pistillate catkins, similar to those of the Chinquapin, which were found on a single tree growing in the woods in Lehigh Co., Pa. These catkins were about five inches long and composed of a large number of small burrs which when ripe resembled that of *C. pumila*. He had observed the tree for seven years and had never found any staminate catkins. Reference was made to Mr. I. C. Martindale's description of a similar monstrosity near Camden, N. J. (Proc. Phila. Acad. Sci., 1880.) Other teratological examples in various genera were cited in the discussion which ensued.

W. J. Beal read a paper on the escape of seeds of *Sporobolus cryptandrus* when the panicle is moistened.

Prof. C. R. Barnes offered to send on application his key to the Manual of Mosses of N. A.

The Chairman announced the receipt of a letter from Dr.

Gattinger, of Nashville, containing a description of a new species of *Hypericum* from Tennessee.

MONDAY, AUG. 23D.

Prof. F. Lamson Scribner read a paper entitled "Notes on the Orange-leaf Scab in Florida."

Prof. J. H. Pillsbury described a method of making cheap lantern slides from drawings. He employed "tracing gelatine," such as used by lithographers, placing it over a diagram and scratching the lines upon it with a steel point. The gelatine is then placed between glass slips which are bound together and used as an ordinary lantern slide.

Mr. B. E. Fernow distributed circulars of the Fifth Annual Meeting of the American Forestry Congress to be held at Denver, Colo., Sept. 14th-20th, 1886.

Dr. N. L. Britton read a paper on the Composition and Rearrangement of the Columbia College Herbaria, and another on the species of the genus *Anychia.*

The committee appointed to nominate officers for the next meeting of the club, consisting of Professors L. M. Underwood, T. J. Burrill and F. L. Sargent, presented the names of M. S. Bebb for President, and Elizabeth G. Britton for Secretary. They were unanimously elected.

TUESDAY, AUG. 24TH.

Prof. W. J. Beal was elected President *pro tem.*

Prof. E. W. Claypole remarked "On the Appearance of European Immigrant Plants in Summit Co., Ohio."

Prof. F. L. Scribner read a paper on the Botanical Characters of the Black Rot of the Grape.

The following resolutions were then unanimously adopted:

Resolved, That the members of the Botanical Club of the A. A. A. S. heartily thank the U. S. Commissioner of Agriculture for his promptness and energy shown in appointing an able investigator to prosecute the mycological work recently inaugurated in the Department of Agriculture, and in giving him opportunities to study the Fungi which are injurious to cultivated plants. While they are gratified with the beginning made, they express the hope that this work will be still further supported. The Botanists here assembled hereby renew their promise to render the U. S. Commissioner of Agriculture any assistance in their power toward making investigations in any department of Botany.

Resolved, That the hearty thanks of the Botanical Club of the A. A. A. S. be tendered to the Botanical Club of Buffalo for the bountiful hospitality which they have shown to their brethren from abroad, and not less for the graceful and courteous manner in which this hospitality has been extended, with the promise that wherever our meetings may be held in the future every visiting Buffalo botanist will find a warm reception in our hearts and homes.

The President *pro. tem.* expressed the thanks of the Club to Prof. J. C. Arthur for his valuable services as Secretary in the past and his arduous labors in organizing the present meeting.

The Club then adjourned to meet at 9 A.M. on the second day of the next meeting of the A. A. A. S.

In the Biological Section the following papers were presented: Atavism the Result of Cross-breeding Lettuce, by E. Lewis Sturtevant; The Bulliform or Hygroscopic Cells of Grasses and Sedges Compared, by W. J. Beal; Synopsis of North American Pines based upon Leaf Anatomy, by J. M. Coulter and J. N. Rose; The Development of the Gymnosporangia of the United States, by W. G. Farlow; Plan for Laboratory Work in Chemical Botany, by Lillie J. Martin; A Study in Agricultural Botany, by E. Lewis Sturtevant; Botany of Timber Trees, with special reference to the requirements of Forestry, by B. E. Fernow; Memoranda of a Revision of the North American Violets, by Asa Gray; A Revision of the North American species of the genus *Fissidens*, by C. R. Barnes.

During the meeting of the Association the botanists visited Niagara Falls and Point Abino, Canada, excursions kindly provided by the local committee.

Index to Recent American Botanical Literature.

Abies Engelmannii. (Garden, xxx., p. 100.)

It is stated that this tree succeeds remarkably well in St. Petersburg despite the extreme cold of Russian winters, and that it is not improbable that it will in the future form an important element in the formation of artificial forests in Northern Europe.

Agrimonia Eupatoria. P. Baccarini. "Intorno ad una probabile funzione meccanica dei cristalli di ossalato calcico." (Ann. R. I., Bot. di Roma., i., p. 154, t. xv.)

Amaryllis Atamasco. (Vick's Ill. Month. Mag., ix., p. 207; colored plate.)

Aquilegia Skinneri, Hook. (Gard. Chron., xxvi., p. 146.)

Asimina.—The Genus. Asa Gray. (Botan. Gazette, xi., pp. 161-164.)

Dr. Gray recognizes six North American species of this genus: *A. triloba*, Dunal; *A. parviflora*, Dunal; *A. grandiflora*, Dunal; *A. cuneata*, Shuttleworth, (which is probably *A. reticulata*, Chapm.); *A. angustifolia*, n. sp., (*Uvaria pygmæa*, Torr. and Gray, in part), and *A. pygmæa*, Dunal. The fruits of the southern shrubby species have been but rarely collected, and are much needed in herbaria. The petals of *Asimina* are not truly valvate in aestivation as was formerly supposed, but when fully grown their summits are more or less imbricated.

Azalea occidentalis. (Gard. Chron., xxvi., pp. 104, 105, f. 21.)

Botanical Trip into Lower California. C. R. Orcutt. (W. Am. Scientist, ii., pp. 53-58.)

This is an amusing and interesting account of personal experiences in collecting specimens during March of this year. Near the mouth of San Telmo Cañon were found "beautiful specimens of Dr. Parry's *Harfordia*," and localities for many other interesting plants are noted.

Calochortus Obispoensis, n. sp. J. G. Lemmon. (Botan. Gazette, xi., pp. 180, 181.)

This species is allied to *C. Weedii* and *C. clavatus*, and has been collected in several places about San Luis Obispo, Cal.

Carpenteria Californica. (Gard. Chron., xxvi., p. 115, f. 22; also p. 149.)

Castanea vulgaris.—Observations on the Structure of. P. H. Dudley. (Journ. N. Y. Micros. Soc., ii., pp. 73, 74.)

Cayuga Flora, The.—(Part I). Wm. R. Dudley. (Bull. Cornell Univ. (Science), vol. ii., 8vo, pp. 30 + 132, Ithaca, 1886.)

A most valuable catalogue of the Phanerogamia growing without cultivation in the Cayuga Lake Basin, Western New York. 1.160 species and 118 varieties are enumerated. The species native to the region number 963, those introduced 197, and those spontaneous but not established and not included in the above, number 53. In the introduction the following topics are ably discussed: "The Limits of the Flora and its Physical Characters," "The Lesser Floras," "The Affinities of the Cayuga Flora," "The Primitive Flora," "Sketch of the Explorations," "Statistics of the Catalogue," "Explanation of the Plan of the Catalogue," and "The Disappearance of Species." Two excellent maps—one of the lake region of Central New York, the other of Ithaca and vicinity—are prefixed, and an index to genera and species is appended. Full localities are given for all species listed; all forms mentioned, not recorded in Gray's Manual, are described in full. Altogether we regard Professor Dudley's work as one of the most useful and interesting local plant catalogues yet published.

Chionanthus Virginica, L. R. Pirotta. "Sulla struttura del seme nelle Oleacee." (Ann. R. I. Bot. di Roma, i., pp. 1-48, t. i-v.)

Corydalis aurea and its Allies. Asa Gray. (Botan. Gazette, xi., pp. 188, 189.)

C. micrantha, n. sp. is the *C. aurea,* var. *micrantha,* of Engelmann.

Cotton Fibre. H. L. Brevoort. (Journ. N. Y. Micros. Soc., ii., p. 81; two figures.)

Dandelion.—The. E. L. Sturtevant. (Proc. Sixth Meeting Soc. Prom. Agric. Sci., pp. 40-42; also in Amer. Nat., xx., pp. 5-9; see note in this BULLETIN, xiii., pp. 10, 11.)

Edible Mushrooms of the United States. Thomas Taylor. (In Rep. Comm. Agric., 1885, pp. 100-108, one colored plate.)

Descriptions and figures are given of *Lactarius deliciosus, Cantharellus cibarious, Marasmius oreades, Hydnum repandum, Agaricus campestris, Coprinus comatus, Morchella esculenta, Clavaria cinerea, C. rugosa, Boletus edulis, Lycoperdon giganteum* and *Fistulina Hepatica.*

Elias Magnus Fries. Wm. R. Dudley. (Journ. Mycol., ii., pp. 91-94.)

An interesting account of the life and work of this great mycologist.

Fertilization in Campanula Americana.—The process of. C. R. Barnes. (Proc. Thirty-fourth Meeting A. A. A. S., p. 293, abstract; published in Botan. Gazette, x., pp. 349-354, plate.)

Florida Fungi.—Notes on. W. W. Calkins. (Journ. Mycol., ii., pp. 89, 90.)

A list of thirty-five species of *Polyporus* with habitats.

Fraxinus Americana, L. R. Pirotta. "Sulla struttura del seme nelle Oleacee." (Ann. R. I. Bot. di Roma, i., p. 1-48, t. i-v.)

Fungi of California.—Notes on some injurious. W. G. Farlow. (Proc. Thirty-fourth Meeting A. A. A. S., pp. 300-303; also in Proc. Sixth Meeting Soc. Prom. Agric. Science, pp. 29-31.)

Dr. Farlow found *Nicotiana glauca*, Grah., afflicted with *Peronospora Hyoscyami*, DeBy.; *P. Halstedii*, a common species of the Eastern States, grows on *Madia sativa* near San Francisco, and *P. leptosperma*, DeBy., on *Artemisia Ludoviciana* in Southern California.

Fungi from various Localities.—New Species of. J. B. Ellis and B. M. Everhart. (Journ. Mycol., ii., pp. 87-89.)

A new genus, *Coscinaria*, of the Pyrenomycetes, of a single species, *C. Langloisii*, from near Baton Rouge, La., a variety of *Dacrymyces corticoides*, E. and E., *Peziza heteromorpha*, *Hypoxylon bicolor* and *Diatrype Comptoniæ* are characterized.

Fungous Diseases of Plants. F. Lamson Scribner. (In Rep. Comm. Agric., 1885, pp. 76-87, two plates.)

Germination Studies. E. L. Sturtevant. (Proc. Thirty-fourth Meeting A. A. A. S., pp. 287-291.)

Gopher-root. Dudley W. Adams. (Gard. Month., xxviii., p. 244.)

A local name in Florida for *Chrysobalanus oblongifolius*.

Grasses of Yellowstone National Park. I.—F. Lamson Scribner and Frank Tweedy. (Botan. Gazette, xi., pp. 169-178.)

This paper is the first part of an enumeration of the Gramineæ of the Yellowstone, collected by Mr. Tweedy in 1884 and 1885. The new forms described are as follows: *Alopecurus occidentalis; Stipa comata*, Trin. and Rupr., var. *intermedia*, and *Deyeuxia dubia*; six of the species enumerated are not in Coulter's Manual.

Gymnosporangium macropus on Pyrus coronaria. B. D. Halsted. (Botan. Gazette, xi., pp. 190, 191.)

Hybridization and Cross-breeding of Plants. E. L. Sturtevant. (Proc. Thirty-fourth Meeting A. A. A. S., pp. 283-287.)

Ipomœa leptophylla. (Vick's Ill. Month. Mag., ix., p. 24.)

The popular name Man-of-the-earth is applied to this species in Colorado as it is in the East to *I. pandurata*.

Iris Douglasiana. (Gartenflora, t. 1,222.)

Lettuce. E. L. Sturtevant. (Proc. Sixth Meeting Soc. Prom. Agric. Science, pp. 43, 44; see also Amer. Nat., xx., pp. 230-233, and note in this BULLETIN, xiii., p. 44.)

Lilium Parryi. This lily from S. California is figured in Illustration Horticole, t. 595.

Mechanical Injuries to Trees by Cold. T. J. Burrill. (Proc. Thirty-fourth Meeting A. A. A. S., pp. 298-300, abstract.)

Medicinal Plants. Geo. Vasey. (In Rep. Comm. Agric., 1885, pp. 63-75; sixteen plates.)

Among foreign medicinal plants which may, perhaps, be successfully cultivated in the United States, Dr. Vasey notes the Poppy, which has already been tried in several States, Liquorice, Rhubarb, Vanilla, which he thinks may be successfully grown in southern Florida, and the Marsh Mallow, which has become locally naturalized on the coasts of New York and New England. Descriptions and good figures are given of the following native species of medicinal value: *Jeffersonia diphylla*, *Ilex Cassine*, *Rhamnus Purshianus*, *Cassia Marylandica*, *Gillenia trifoliata*, *Hamamelis Virginica*, *Liquidambar styraciflua*, *Grindelia robusta*, *Eriodictyon glutinosum*, *Euphorbia corollata*, *E. Ipecacuanhæ*, *Aristolochia Serpentaria*, *Asarum Canadense*, *Anemopsis Californica*, *Arisæma triphyllum*, and *Symplocarpus fœtidus*.

Megarrhiza Californica. A. Baldini. "Sul tallone di alcune Cucurbitacee." (Ann. R. I. Bot. di Roma, i., p. 49, t. vi.)

Nelumbium luteum. P. Baccarini. "Osservazioni anatomiche sopra alcuni ricettacoli fiorali." (Ann. R. I. Bot. di Roma, i., p. 82, t. xiii, fig. 11.)

Notholæna tenera, Gill.—A rare fern. L. G. Yates. (Botan. Gazette, xi., p. 181.)

This fern, hitherto found only in the United States at a single station in southern Utah, is now reported from Santa Barbara Co., Cal.

Nuphar.—Revision of the North American species of. Thomas Morong. (Botan. Gazette, xi., pp. 164-169; one plate.)

Five species are described: *N. advena*, Ait., which extends westward to Utah, with a var. (?) *minor*, having flowers about an inch in diameter when expanded, from Herkimer Co., N. Y.; *N. rubrodiscum*, n. sp., common in parts of Lake Champlain, which Mr. Morong suspects to have originated from a hybrid between *N. advena* and *N. Kalmianum* (*N. luteum*, var. *pumilum*, Gray), which latter is his third species; *N. polysepalum*, Engelm., of western America, and *N. sagittifolium*, Pursh., of the southern Atlantic States.

Osmanthus Americana (*Olea Americana*). R. Pirotta. "Sulla struttura del seme nelle Oleacee." (Ann. R. I. Bot. di Roma, pp. 15-17, t. i., fig. 9-10.)

Outline of Study of Chemical Botany. Lillie J. Martin. (Botan. Gazette, xi., pp. 178-180.)

Pear Blight.—Proof that Bacteria are the direct cause of the disease known as. J. C. Arthur. (Proc. Thirty-fourth Meeting A. A. A. S., pp. 295-298; also in Botan. Gazette, x., pp. 343-345, and in Gard. Chron., xxiv., p. 586.)

Pig-nut Hickory.—A fine. (Gard. Month., xxviii., pp. 241-243; one figure.)

A tree of this *Carya*, 113 feet high and 12 feet in circumference 5 feet above the ground, is reported growing on the property of Mr. Geo. W. Childs, in Philadelphia. A good figure is given, taken from a photograph of the tree while it was bare of leaves.

Pinus monophylla. Sir J. D. Hooker. (Gard. Chron., xxvi., p. 136, fig. 24.)

Sir J. D. Hooker questions the correctness of Dr. Newberry's conclusion that *P. monophylla* is but a form of *P. edulis* (Bull. Torr. Bot. Club., xii., p. 50), and adduces personal observations in Nevada, as well as experience at Kew, to show that the two are specifically distinct. Dr. Hooker states that he is "not aware whether their male and female flowers and cones have been critically compared."

Pond-scums (Zygnemaceæ).—The Question of Bisexuality in the. C. E. Bessey. (Proc. Thirty-fourth Meeting A. A. A. S., p. 291; abstract.)

Professor Bessey concludes that these plants possess undifferentiated sexuality, and may be designated unisexual; also that they are to be classed with the lower Thallophyta, but little above Protophyta.

Prothallium of Ferns. Douglas H. Campbell. (Proc. Thirty-fourth Meeting A. A. A.S., pp. 292, 293, abstract; published in Botan. Gazette, x., pp. 355-360; plate ix.)

Relation of Ovary and Perianth in the Development of Dicotyledons. J. M. Coulter. (Proc. Thirty-fourth Meeting A. A. A. S., pp. 294, 295; abstract published in Botan. Gazette, x., pp. 360-363.)

Rhus typhina.—The Stag's-Horn Sumach. (Garden, xxx., p. 111.)

It is noted that the collection and preparation of the leaves has assumed large proportions in Virginia.

Ræsteliæ from Gymnosporangia.—Development of. W. G. Farlow. (Botan. Gazette, xi., pp. 189, 190.)

Mr. Roland Thaxter has continued Dr. Farlow's cultures of spores of the Gymnosporangia upon young plants of *Amelanchier.* Those of *G. clavipes*, C. and P., were followed by *R. aurantiaca*, Peck; those of *G. conicum*, DC., by *R. cornuta*, Fr., and those of *G. clavariæforme*, DC., by *R. lacerata*, Fr.

Rubus deliciosus.—The Odor of. (Gard. Chron., xxvi., p. 50.)

The odor given off by the young foliage and flower buds of this showy western bramble is compared to that of bleaching linen or soap-suds, and is not disagreeable. It seems that all the plants grown in England bear white flowers. At Kew it blooms abundantly but never matures any fruit.

Science of Botany.—The Demands made by Agriculture upon the. C. E. Bessey. (Proc. Sixth Meeting Soc. Prom. Agric. Sci., pp. 16-18.)

Smut of Timothy. Wm. Trelease. (In Rep. Comm. Agric., 1885, pp. 87, 88; plate xviii.)

This disease is caused by the growth of the fungus *Tilletia striæformis*, Westd., which occurs in Europe in the leaves of several other grasses, and has been noticed by Professor Trelease in Wisconsin on *Elymus Canadensis*, var. *glaucifolius*, and in Massachusetts on *Triticum repens.* It was especially destructive to Timothy in parts of Wisconsin in the spring of 1883 and 1884.

Spiral Fibre of the Banana Stalk. J. L. Zabriskie. (Journ. N. Y. Micros. Soc., ii., pp. 71-73; one figure.)

Taxodium distichum. (Gard. Chron., xxvi., p. 148, fig. 28.)

Illustrations are given of abnormal growths of shoots, in some cases showing an indication of the formation of ovules at the base of the thickened bud scales.

Trichias.—The banded-spore., Geo. A. Rex. (Journ. Mycol., ii., pp. 85-87.)

Of the three species of the Slime Mould genus *Trichia* distinguished by reticulated or banded spores, only *T. chrysosperma*, Bull., has heretofore been recorded as American. Dr. Rex now finds plants which nearly answer the descriptions of *T. affinis*, De By., and *T. Jackii*, Rostfki. A list of specimens from widely separated localities is given.

Vancouveria. Asa Gray. (Botan. Gazette, xi., pp. 182, 183.)

Dr. Gray dissents from M. Franchet's views (Bull. Soc. Bot. France) that the genus should be merged in *Epimedium*.

Variation in Cultivated Plants. W. W. Tracy. (Proc. Sixth Meeting Soc. Prom. Agric. Science, pp. 45-48.)

Vitality of Seeds buried in the Soil. W. J. Beal. (Proc. Sixth Meeting Soc. Prom. Agric. Sci., pp. 14, 15.)

Wellingtonia gigantea. (Gard. Chron., xxvi., p. 18, f. 4.)

Trees of the giant *Sequoia*, planted in Lancashire, England, in the autumn of 1864, have now reached a height of 40 feet, and are 8 feet in circumference just above the base. A reproduction from a photograph illustrates one of the trees.

Woods and their Destructive Fungi. P. H. Dudley, C. E. (Pop. Sci. Month. xxix., pp. 604-617, illustrated.) II.

The practical side of the subject, detailing the action of fungi on telegraph poles, fence posts, ties and timbers, with descriptions and illustrations of their special enemies, and their mode of attack, are here given. The article concludes with a discussion of the various methods of preserving wood and an estimate of the annual loss in money to the railroads in this country resulting from the action of fungi.

Botanical Notes.

Annuario del R. Instituto Botanico di Roma. Edited by R. Pirotta. We have just received the first four fascicles of this valuable periodical, illustrated by twenty-eight beautiful lithographs. Besides several interesting general articles, there are enumerated the fungi, lichens, algæ, and hepatics from the vicinity of Rome. In the last fascicle a new species of *Plagiochila* is described and figured.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XIII.] New York, October, 1886. [No. 10.

Notes on the Orange Leaf Scab.*

By F. Lamson Scribner, U. S. Dept. Agriculture.

Last summer, and also during the present season, there have been received at the Department of Agriculture Orange leaves that were diseased or injured through the action of some agency not yet well understood.

Mr. Chas. W. Campbell, writing from Ocala, Florida, July 29th, 1886, says that "the disease first made its appearance last summer and seems to be increasing the present season, particularly on young trees making vigorous growth. It seems to be confined to sour stocks, although this season it has appeared on Lemon trees. No sweet Orange trees have been affected, nor the sweet buds on sour stocks, even when growing side by side with trees badly affected. It is very destructive to the growth of trees, and ruinous to young nursery stocks, so that fears are entertained that it will seriously affect the Orange interest unless means are discovered for checking it. Last season and this have been exceedingly wet, and the appearance of the fungi may be due to this fact."

I desire to call attention to this subject more especially because there seems to be no literature upon it, and there is a probability that the disease in question is new; it is at least, of very recent appearance in Florida. The samples received exhibit a malady of a serious nature; one certainly deserving careful investigation. The entomologists affirm that there is no evidence nor probability of its being caused or induced by insects.

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* Read before the Botanical Club of the A. A. A. S., Buffalo Meeting, August, 1886.

There first appears upon either the upper or lower surface of the leaves, more particularly upon the latter, and upon the young shoots, small, light colored wart-like excrescences. These excrescences increase in number and size, the approximate ones often running together, until the whole surface is covered, destroying, of course, the vitality of the leaf. When young leaves are attacked they become more or less distorted, and their full development is prevented. The top of the older warts, if one may so term them, are dark brown, or nearly black, due to the presence of a dense fungus growth, which exhibits under the microscope, a multitude of irregularly developed conidiophores, bearing oblong, oval one-celled conidia. Such low forms as here presented are almost unnameable, and are quite beyond definite classification, yet they are often among the most injurious of fungi; but whether this particular fungus be the cause of the disease it accompanies I cannot at present say. Upon some diseased specimens recently received from Ocala, Fla., there was discovered a species of *Fusarium*, which Mr. J. B. Ellis, to whom samples were submitted, believes to be identical with *F. sarcochroum*, Desm., and he expresses the opinion that the tubercles are caused by the mycelium of this fungus, these being the first outward manifestations of its growth.

It may be going too far to advance any opinion at this time, but I will say that after making many careful examinations of the samples received, I am disposed to think that the injury in question is occasioned by the first fungus referred to above, the hyphæ and spores of which are present in greater or less abundance on all the more developed excrescences.

From letters received from Mr. C. F. A. Bielby, of De Land, Fla., we learn: *First*—That the trees most severely affected with this leaf disease last season suffered more than those not affected, during the winter. *Second*—Trees affected last season are the ones first attacked this spring, although the foliage of these is entirely new growth. *Third*—So far as observed, sour trees alone are affected. *Fourth*—Location and nature of the soil, or of the fertilizers used, have no influence on the disease. *Fifth*—The most vigorous as well as the "sickly" trees are alike affected. *Sixth*—If a tree is diseased in part the tendency is for the whole tree to become so. *Seventh*—The malady does not appear to spread in the grove, but may occur at several points simultaneously. The evidence of these facts points to a fungus origin for the disease.

REMEDIES.—The application of the following are recommended for trial as having fungicidal properties: *First*—A solution of bisulphide of potassium, ½ ounce to a gallon of water. *Second*—"Liquid grison," prepared by boiling 3 lbs. each of the flowers of sulphur and lime in 6 gallons of water until reduced to 2 gallons. When settled, pour off the clear liquid and bottle it for use. For use mix one part of this clear liquid in 12 gallons of water. *Third*—To 10 gallons of strong soap suds add about a pound of glycerine and one-half pint of carbolic acid.

These solutions should be applied in the form of a fine spray to the diseased trees. As intimated, what action they may have towards arresting the malady can only be determined by experiment.

Pinus monophylla and Pinus edulis.

In the BULLETIN for May, 1885, I published a note on my observations on *Pinus edulis* and *Pinus monophylla* in the far West. By these observations I was convinced that *Pinus monophylla* is but a variety of *P. edulis*, a variety confined to the more arid portions of the area it occupies; and I was led to consider *P. monophylla* as a desert plant, in which the leaves are consolidated to diminish their surface area; following the example of *Cactus*, *Holacantha*, *Canotia*, *Ephedra*, etc.

I am sorry to see from a note in the Gardeners' Chronicle of July 31st, that Sir Joseph Hooker does not accept my view of the case. He says, of my article, that "it reads well, but is not supported by facts." Now, with due respect to the great botanist whom we all delight to honor, I am compelled to appeal from his decision. If he could have had my experience, and had himself observed the facts from which I infer the specific identity of the two forms, I am quite sure he would accept the view I have advanced. It happens that I have spent two full years in the region occupied by the pines under consideration, and during that time I traversed nearly their entire habitat, viz., Nevada, Utah, Colorado, New Mexico, Arizona and Chihuahua. As botanist of the

Colorado and San Juan expeditions, my attention was naturally early drawn to trees which are the most conspicuous, and over large areas almost the only arborescent elements in the vegetation, and I have studied every phase of change from one variety into the other. In the Rocky Mountains all are two-leaved; in some arid portions of Nevada the tree is dwarfed to half its normal size and all the leaves are single. Midway between these districts, in southern Utah, may be found thousands of trees in which the leaves are half double, half single; and I would ask to which species these belong? It is not strange that to one examining *Pinus edulis* in Colorado, then going by rail to Nevada and there finding only *Pinus monophylla*, they should seem distinct; but to one who should travel by day marches from one district to the other, seeing the two forms gradually blending, I am sure they would be regarded only as geographical varieties.

I have called the Nevada form depauperate, a term to which Sir Joseph Hooker objects, because, as he says, the leaves are not dwarfed; but there are not half as many on the Nevada tree, which has generally shrunk to half the size of its eastern cousins, and in the dryest places it inhabits is barely more than a bush.

I may also add that Dr. Engelmann and Dr. Torrey were both satisfied of the specific identity of the two forms. This Dr. Torrey has put on record in his catalogue of the plants which I collected on the Colorado Expedition ("Report Upon the Colorado River of the West"), where, under the name "*Pinus edulis*, Engelm. (*P. Fremontiana*, Gord.)", which is said to be "common in all the higher portions of New Mexico," "*var. monophyllus*, Torr.," is recorded and referred to its habitat in the Cerbat Mountains, Arizona. In these circumstances it will perhaps not seem surprising that I adhere to my opinion that the two forms are but varieties of one species, and that the geographical distribution of these varieties illustrates in an interesting manner the influences which have produced the variation.

A peculiar confusion seems to exist in the minds of botanists in reference to the group of small nut-pines which inhabit our Western Territories and Northern Mexico, viz.: *P. cembroides*, Zucc.; *P. edulis*, Engelm.; *P. monophylla*, Torr. and Frem. (*P. Fremontiana*, Endl. not Gordon); and *P. Parryana*, Englm.

(*P. Llaveana*, Schiede and Deppe.) They are very much alike in habit, cones and flowers, but differ in the number of leaves; *P. Parryana* has three to five, generally four; *P. cembroides*, three, sometimes two; *P. edulis* two, and *P. monophylla* one or two. Dr. Engelmann suggests, what seems very reasonable, that they are all geographical varieties of one species.

I would refer those interested in the subject to Flora, 1832, Beib. ii., 93; Endlicher, Synopsis Coniferarum, pp. 192, 193; Gordon, Pinetum, pp. 265-274; Veitch, Manual of the Coniferæ, p. 160; Engelmann, Revision of the Genus *Pinus*, pp. 16-18.

J. S. NEWBERRY.

On the Species of the Genus Anychia, Richard.[*]

BY N. L. BRITTON.

In the course of my investigation of the flora of New Jersey I have been impressed by the difference in appearance and habitat of the two well known forms of *Anychia*—the one spreading, more or less pubescent, short jointed and small leaved, occurring mainly in open places, the other slender, erect, smooth, larger leaved and longer jointed, preferring dry woodlands, and have now reached the conclusion, after a critical examination of many specimens both in the field and the herbarium, that they are best regarded as distinct species. Under the generic name *Queria* they were early separated by Nuttall, (Genera, 158, 159,) who knew the pubescent, short jointed spreading form as *Q. Canadensis*, and the slender, smooth, erect one as *Q. capillacea*; I have examined a specimen of the latter named by himself. DeCandolle (Prodromus, iii., 369,) referring the plants to Michaux's genus *Anychia*, retained the two species as *A. dichotoma*, Michx., and *A. capillacea*, DC., though expressing some doubt as to their distinctness, and was in this followed by Beck (Bot., 131); this was again maintained by Mr. J. H. Redfield (Bull. Torr. Club, vi., 61, 62), and Bentham and Hooker in Genera Plantarum, iii., 17, regard the genus as consisting of two North American species. By all other authors, so far as I have been able to learn, the two have been considered as conspecific, or, regarding the spreading short jointed form as the type of a species, the slender erect one has been made a variety, following Torrey in Flora North. U.S., 273. Linnaeus' *Queria Canadensis* appears from his description to have been the slender form. My experience with the plants has been just that of Mr. Redfield as related by him in the paper above cited, except as to the length of the calyx lobes, which I find to be variable in both species. That the difference between the two is not caused by habitat alone—though it may well have originated from some such cause—is indicated by the occurrence of *A. capillacea* in open fields formerly covered by forest but from which the trees have been removed many years. We should expect to find the plants assuming the spreading, pubescent form under these conditions if habitat was the sole agent in the variation, but I am well satisfied that this does not take place at the present time. I have also noticed *A. capillacea* growing as a weed in gardens.

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[*] Read before the Botanical Club of the A. A. A. S., Buffalo Meeting, August, 1886.

As to the distribution of the species, *A. capillacea* is certainly most abundant northward, extending to southern New Jersey and Pennsylvania and probably much farther southward, and westward to Missouri; *A. dichotoma* appears to be of more southern distribution, but is found in New York and New England.

A partial bibliography, as I understand it, is as follows:—
A. dichotoma, Michx., Flor. Bor. Amer., i., 113; Pursh, Flor. Amer. Sept., i., 176; Rœm. & Schultes, Syst. Veg., v., 525; Torrey, Flora North. & Mid. U. S., 273; Flora N. Y., i., 105; DeCandolle, Prodr., iii., 369; Beck, Bot., 131; Torr. &. Gray, Flora N.A., i., 172; Darlington, Flora. Cestr., 162; Gray, Man., Ed. 1848, 65; Ed. 1867, 96; Wood, Class Book, Ed. 1855, 185; Chapm., Flora South. U. S., 46; Young, Flora Texas, 174; Redfield, Bull. Torr. Bot. Club, vi., 61, 62; Schrenk, l. c., 297; Kellerman, Plant Anal., 165.

A. Canadensis, Ell., Sketch, i., 307; Hook., Flor. Bor. Amer., i., 226; Darby, Bot. South. U. S., 243.

Queria Canadensis, Nutt., Gen., 158; Barton, Comp. Flora Phil., i., 74; Eaton, Man., 2nd Ed., 394; 6th Ed., 295.

Paronychia Canadensis, Wood. Bot. &. Flor., 58; (this description would include both species; his var. *pumila* is probably but a form of *A. dichotoma*).

A. fastigiata, conferta, polygonoides and *lateralis*, Raf., in Torrey Herbarium.

A. capillacea, DC., Prodr., iii., 369; Beck, Bot., 131; Redfield, Bull. Torr. Bot. Club, vi., 61.

A. dichotoma, var. *capillacea*, Torrey, Flora North. & Mid. U. S., 273; Gray, Gen., ii , 19, 20, plate 104; Wood, Class Book, Ed. 1855, 185.

A. Canadensis, var. *capillacea*, Eaton, Man., 6th Ed., 295.

A. dichotoma, var. β. Torr. & Gray, Flora N.A., i., 172.

A. filiformis, Raf., in Torrey Herbarium.

Queria Canadensis, L., Sp. Plant., 1st Ed., 90; 3rd Ed., 132; Orteg., Dec., t. 15, f. 2(?); Gærtner, Fruct. & Sem., ii., 217, t. 128; Muhl., Cat., 15; Bigelow, Flora Bost., 99.

Q. capillacea, Nutt., Gen., 159; Barton, Comp. Flora Phila., i., 74.

Q. Canadensis, var. *capillaris*, Provancher, Flor. Can., i., 85.

Notes on Some Introduced Plants, Chiefly in Summit Co., Ohio.*

BY PROF. E. W. CLAYPOLE.

The overrunning of the Western world by the flora of the Eastern is a fact of such great interest to the philosophical botanist that every step in the march deserves notice. As we look back we are often unable to determine where a foreign plant first entered a given district for want of accurate notes of its earliest appearance. Hence I have thought it worth while to place the following notes on record.

The following plants have been known for many years in adjoining counties and in some part of Summit, but they have recently increased far beyond their previous amount, and threaten to become mischievous :—the English Buttercup, *Ranunculus acris* and the Narrow leaved Plantain, *Plantago lanceolata*.

The following are in the same condition of distribution, but are beneficial rather than mischievous :—Orchard Grass, *Dactylis glomerata*, Tall Fescue, *Festuca elatior*.

Those given in this list are already common in some of the

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* Read before the Botanical Club of the A. A. A. S. at the Buffalo Meeting, August, 1886.

Eastern States but have only recently appeared in Summit Co., and give promise of rapid increase:—Alsike Clover, *Trifolium hybridum*; Bird's Foot Clover, *T. agrarium*; Carrot, *Daucus Carota*; Coltsfoot, *Tussilago Farfara*; Canada Thistle, *Cirsium arvense*; Prickly Lettuce, *Lactuca scariola.*

This list contains the names of some European species introduced in some of the Eastern States which have appeared in Summit Co., but in very small numbers or in single specimens, and whose spread is as yet doubtful:—Salsify, *Tragopogon porrifolius*, increasing in two or three spots, also at St. Catharine's Ontario; Mugwort, *Artemisia vulgaris*, single plant; Upright Cinquefoil, *Potentilla recta*, single plant; Yellow Flag, *Iris Germanica*, single clump: Field Cress, *Lepidium campestre*, one small group; Barberry, *Berberis vulgaris*, a few bushes in one spot.

This list contains the names of unsuccessful immigrants represented by single or few plants destroyed soon after their arrival: —Birds-foot Trefoil, *Lotus corniculatus*; Hemlock, *Conium maculatum.*

I add here the names of a few immigrants observed elsewhere but not yet generally common: Lucerne, "alfalfa," *Medicago sativa*, steets of Salem, O.; Good King Henry, *Chenopodium bonus-Henricus*, Franklin, Pa., and Niagara, N. Y.; Mexican Tea, *C. ambrosioides*, streets of Pittsburgh; Galinsoga, *Galinsoga parviflora*, lax and dense varieties, streets of Pittsburgh near High school: English Groundsel, *Senecio vulgaris*, Nesquetoning, Pa., abundant.

Notes from the Saguenay River.

The little French village of St. Alexis in the province of Chicoutimi, Quebec, bordering upon its slightly larger neighbor St. Alphonse, is built upon a narrow margin of alluvium and drift surrounding the higher ledges of syenite behind it and looks straight down the wide and beautiful Ha-Ha bay, past steep capes on its eastern shore, and retreating slopes of argillaceous farm land on the west, to the distant course of the Saguenay river. The latitude is 48° N. and the situation is therefore boreal and cold. The flora has an alpine aspect. A very brief stay at this attractive spot enabled me to make a few general notes on its vegetation, which may interest some readers, from the remoteness of the region, though only the most conspicuous species and their prevalence are mentioned. The time of my visit was at the middle of July, when the day temperature was seldom much over 70° F. and the night, at times, as low as 50°.

Over the syenite hill upon which the hotel stands, *Kalmia angustifolia*, L., grows in great abundance, while the pretty *Potentilla tridentata*, Ait., spangles the rocks in white patches. In sunny spots the vetch, *Vicia Cracca*, L., raises its purple or blue spires and the red-berried stems of *Cornus Canadensis*, L., fill the cooler nooks. Superb displays of *Actæa spicata*, L., var. *rubra*, are seen in the woods where *Sambucus pubens* shows its coral berries. The yellow-rattle *Rhinanthus Crista-galli*, L., occurs plentifully, and through the uplands *Euphorbia Helioscopia*, L., with *Thlaspi arvense*, L., is seen. Over many ledges the Labrador tea, *Ledum latifolium*, Ait., spreads its flannel lined leaves with *Chiogenes hispidula*, T. and G., *Gaultheria procumbens*, L., and *Vaccinium Vitis-Idæa*, L. In many places *Silene inflata*, Smith, becomes a weed; in wet spots the cottony heads of *Eriophorum polystachyon*, L., cluster, and rarely the fragrance of *Spiranthes Romanzoviana*, Chamisso, arrests attention. *Aralia hispida*, Michx., *Myosotis palustris*, Withering, *Diervilla trifida*, Mœnch, *Epilobium angustifolium*, L., *Geum strictum*, Ait., *Thalictrum Cornuti*, L., *Campanula rotundifolia*, L., are easily gathered, while less abundant are *Sanicula Canadensis*, L., *Rudbeckia hirta*, L., *Linum usitatissimum*, L., *Cornus stolonifera*, Michx., *Antennaria margaritacea*, R. Br., *Epilobium palustre*, L., and *Potentilla Norvegica* L.

Our common wayside plants appear in this northern station. Here are seen *Brunella vulgaris*, L , *Leonurus cardiaca*, L., *Stellaria media*, Smith, *Œnothera biennis*, L., *Galeopsis Tetrahit*, L., *Chenopodium album*, L., *Lactuca Canadensis*, L., *Capsella bursa-pastoris*, Mœnch, and *Ranunculus acris*, L. Two clovers are distributed here, *Trifolium repens*, L., and *T. pratense*, L. The fertile patches of strawberries (*F. vesca*, L., and *F. Virginiana*, Ehrh.) crowd the hillside, and amongst berry producers we find *Ribes Cynosbati*, L., *Rubus triflorus*, Richardson, *R. strigosus*, Michx., and *Vaccinium Pennsylvanicum*, Lam.

Larch and Spruce are abundant, while Birch and Poplar cover over as a second growth the bared hillsides. The rich and varied display of mosses is surprising, and heavy cushions of humus formed by their decay hide the rocks with an elastic carpet.
L. P. GRATACAP.

Aconitum Noveboracense, Gray.*

BY FRED. V. COVILLE.

In the Columbia College herbarium are specimens of an *Aconitum* labeled, "*Aconitum uncinatum*, Greene, Chenango Co., N. Y., received May 30, 1857, A. Willard."

In the BULLETIN of the Torrey Botanical Club for 1885, (Vol. xii., p. 52), a single specimen of the same species is reported to have been found by A. L. Coville at Oxford, Chenango Co., N. Y. In the fall of 1885 the writer found at Oxford another station, the specimens numbering about sixty. Specimens of these, together with those from Greene, in the Columbia College herbarium, came to the hands of Dr. Gray, who decided, as had been before suspected. that the plant was not *Aconitum uncinatum*. He has given it the name *Aconitum Noveboracense*, with the following description:

ACONITUM NOVEBORACENSE, n.sp.

Inter *A. delphinifolium* et *A. Columbianum* collocandum propter racemum angustum subpauciflorum glabrum; caule bipedali erecto folioso; foliis membranaceis, 5–7-partitis, segmentis basi cuneatis trifidis, lobis incisis, lobulis et apicibus lanceolatis; casside gibboso-obovata superne late rotundata fere symmetrica, rostro breviusculo porrecto parum descendente; sepalis anticis angustis parvis; folliculis oblongis.

The casque is higher than that of *A. delphinifolium*, a far northwestern species, but broader, lower, more symmetrical, and much less rostrate than that of *A. Columbianum*. A. G.

Dr. Augustus Willard, the first to find the plant, has long since died, leaving neither herbarium nor plant-records. The original Greene station has therefore been lost, the single plant first found at Oxford has disappeared; so that the only station now known is that about two and a half miles south of the village of Oxford. The plants grow in shaded alluvial soil, on the bank of the Chenango River.

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* Read before the Botanical Club of the A. A. A. S., Buffalo meeting, August, 1886.

The Mode of Destruction of the Potato by Peronospora infestans.*

The tuber of the potato being only an enormous development of the stem must possess all the parts that characterize the exogenous stem. That is, it should show the central pith, the woody or vascular layer, the bark and the epidermis. These may be readily seen with the naked eye on slicing the potato. The vascular layer appears as a semi-transparent line running along the cut surface about a quarter of an inch below the cuticle and rising to the eyes where it meets the layer that represents the bark. At these points the cuticle is exceedingly thin and here the assault of *P. infestans* is usually made. Its progress is marked by a black streak advancing from the eye along the layer of vascular tissüe which it destroys, either rising to the other eyes in its course or meeting similar hosts of enemies advancing from them. A layer of the bark immediately under the peel is attacked in the same manner about the same time. Two parallel black streaks are therefore visible advancing side by side below the skin of the potato.

In these two layers the life of the potato resides and their destruction consequently ensures its death. To them the attack is confined. The starch laden cells of the pith and those between the vascular layer and the epidermis are not injured. Indeed a tuber in this or even in later stages of decay, is one of the best sources from which can be obtained perfect starch-cells with their contents uninjured for microscopic study.

Here the action of *P. infestans* ends. But other enemies soon troop in and complete the ruin it has begun. *Fusisporium Solani* abounds, but the greater part of what remains, the starch cells, is destroyed by *Bacterium termo*, the ubiquitous and ever-ready agent of destruction. This soon reduces the tuber to a mass of decay and to its action is principally due the smell arising from rotten potatoes. E. W. CLAYPOLE, AKRON, Ohio.

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* Read before the Botanical Club of the A. A. A. S. at the Buffalo Meeting, August, 1886.

Index to Recent American Botanical Literature

Arisæma triphyllum.—Notes on. Thos. Meehan (Bot. Gazette, xi., p. 217.)

Mr. Meehan shows that in the vicinity of Philadelphia, the wholly green-leaved, vigorous plants are mainly pistillate, while those which produce leaves glaucous or gray beneath, and are smaller, are mainly staminate.

Botanizing in Texas, II. J. Reverchon. (Bot. Gazette, xi., pp. 211-216.)

Campanula medium.—Notes on. Bolling W. Barton. (Bot. Gazette, xi., pp. 208-211.)

An account of experiments on the cross-fertilization of this plant by insects

Clethra alnifolia. (Garden, xxx., p. 187.)

Flora of our Southwestern Archipelago. Wm. S. Lyon. (Bot. Gazette, xi., pp. 197-205.)

An interesting account of the vegetation of the Santa Barbara Islands.

Florida Fungi.—Notes on.—No. 8. W. W. Calkins. (Journ. Mycol., ii., pp. 104-106.)

Fungi from Various Localities.—New Species of.—J. B. Ellis and B M. Everhart. (Journ. Mycol., ii., pp. 99-104.)

Twenty-five new species are described.

Kansas Algæ —Third Contribution to the Knowledge of. Francis Wolle. (Bull. Washburn Coll. Lab. Nat. Hist., i., pp. 174-175.)

Five species are enumerated which had not hitherto been reported.

Kansas Ferns.—Further Notes on. F. W. Cragin. (Bull. Washburn Coll. Lab. Nat. Hist. i., pp. 175-176.)

Professor Cragin records the discovery of *Asplenium parvulum*, Mart and Gal., by Miss Lillie O. Hosford, in Chautauqua Co., Kansas; he also gives additional localities for other species previously reported.

Kansas Mosses.—Fourth Contribution to the Knowledge of. Eugene A. Rau. (Bull. Washburn Coll. Lab. Nat. Hist., i., pp. 171-173.)

A list of 23 species of mosses not hitherto reported from Kansas and of new localities for many others.

Leucophyllum Texanum. Gilbert Onderdonk. (Gard. Month., ii., p. 277.)

Lichens not previously reported from Kansas. H. Willey. (Bull. Washburn Coll. Lab. Nat. Hist., i., p. 176.)

Five species not hitherto recorded are enumerated.

Liriodendron Tulipifera. (Lloyd's Drugs and Medicines N. A., ii., pp. 1-21, one plate, six figures and a map.)

The first part of the second volume of the Messrs. Lloyd's valuable work contains a full account of *Liriodendron* and our native *Magnolias.* Allusion is made to the difference in color and texture of the wood of the Tulip Tree, a difference well known to all lumbermen, though the cause is as yet unexplained.

Magnolia. (Lloyd's Drugs and Medicines N. A., ii., pp. 21-32, two plates and seven figures.)

Figures of *M. acuminata* and M. *glauca* are given on plates XXVIII and XXIX of the work, and the fruit of *M. grandiflora* on p. 32.

Monterey Cypress at Home. (Garden, xxx., p. 189; one cut.)

A good engraving from a photograph taken of *Cupressus macrocarpa* at Monterey, Cal.

Navajo Names for Plants. W. Matthews, U. S. A. (Amer. Nat., xx., pp. 767-777.)

Dr. Matthews has rendered botanists and philologists a valuable service in recording the names given by the Navajo Indians to many of the plants among which they live. He remarks that their plant-lore is remarkable for its extent and accuracy. The list given is certainly large, numbering 95 species, and there are many others for which no satisfactory etymology can be found.

Pinus edulis. Sir J. D. Hooker. (Gard. Chron. xxvi., p. 300, fig. 61.)

Polyporus officinalis, Fries. W. W. Calkins. (Journ. Mycol., ii., p. 107.)

It is stated that this fine and rare species is occasionally found on living trees of the White Pine in the Michigan forests. The fungus has a very bitter taste, similar to that of quinine, in place of which it has been used to some extent.

Resin Passages of the White Pine.—Structure and Distribution of the. Etta L. Knowles. (Bot. Gazette, xi., pp. 206-208, one plate.)

Ribes oxycanthoides, L. J. D. Hooker. (Curtis's Bot. Mag., (3) xlii., tab. 6892.)

Robinia viscosa.—Native Locality for. H. W. Ravenel. (Gard. Month., xxviii., pp. 276, 277.)

Mr. Ravenel notes that this species was collected by Prof. L. R. Gibbes in 1881 in the same locality recorded by Prof. Sargent in "Forest Trees of North America", p. 56, i. e., "Slopes of Buzzard Ridge, near Highland, Macon Co., N. C., J. Donnell Smith, 1882."

Rust of the Ash Tree. (*Æcidium Fraxini.*) C. E. Bessey. (Amer. Nat., xx., p. 806.)

Twigs killed by Telephone Wires. F. E. L. Beal. (Amer. Nat., xx., pp. 806, 807.)

Variation of Water in Trees and Shrubs. D. P. Penhallow. (Canadian Rec. Sci., ii., pp. 105-116.)

Viola pedata. (Garden, xxx., pp. 140, 141; one cut.)

Xanthosoma sagittifolium. Gerald McCarthy. (Vick's Ill. Month. Mag., ix., p. 42.)

This Aroid grows abundantly in certain boggy localities about Wilmington, North Carolina, and is locally known as Spoon Flower and Wilmington Lily. Its general habit and appearance is much like that of *Sagittaria*, but the leaves are more glossy and very dark green. It blooms from the first of June to the middle of July; the spathe is pure white and spoon shaped. The plant has a long tap root covered with warty excrescences and long, string-like fibres by which it is attached to the roots of the trees among which it grows. The large, coral-red seeds ripen about the beginning of September.

Zamia integrifolia (Gard. Chron., xxvi., p. 146.)

Prof. Sargent writes: "That in Florida this Cycad is largely cultivated for the sake of the starch contained in its roots, great quantities of the starch being made for the Key West and West Indian markets."

Botanical Notes.

Comparative Anatomy of the Filz-like Hair-covering of Leaf-organs. Emily L. Gregory, Bryn Mawr College, Pa. (Inaugural dissertation for obtaining the degree of Doctor of Philosophy presented before the Philosophical Faculty of the University of Zürich, 1886, p. 42, illustrated.)

The thickening of the upper cells of hairs as compared with the basal cells and those of the epidermis beneath them, together with a certain form of stoma, noticed on leaves growing in a very moist atmosphere, suggested the probability of a connection between the hair-covering and the ability of leaves to take up moisture in a liquid state from the atmosphere. The investigations recorded in this paper seem to show that the leaf-hairs may contribute actively to the supply of water in the plant, as well as to prevent the escape of that taken up by the root-hairs. Recent investigations by others tend to substantiate this conclusion. Lists of plants are given which are grouped according to the anatomical and physiological characters of the hair-covering of their leaves. Of those in which the basal-cells of the hairs are living and best fitted to absorb water, the following native or naturalized plants are worthy of mention :—*Tussilago Farfara*, *Inula Helenium*, *Artemisia ludoviciana*, *Antennaria plantaginea*, *Potentilla anserina*, *Anaphalis margaritacea* and *Artemisia vulgaris*. Of those studied in which this function is doubtful the following are mentioned :—*Populus alba*, *Tilia alba and T. pubescens*, *Cynoglossum officinale*, *Dryas Drummondii* and *Ledum latifolium*.

Experimental tests were applied in order to determine the relative power of absorption of the basal cells of hairs as compared with the epidermal cells ; wilted leaves were lightly brushed with water so as to moisten the hairy coating, but not the epidermis, and the recovery of turgescence timed. The plasmolytic condition of the basal cells of hairs was found to be greater than that of the epidermal cells. The most decisive results were obtained with plants of arid regions, *Helicrysum petiolatum* from the Cape of Good Hope and *Salvia argentea* from Southern Europe. In the case of *Alfredia cernua* an interesting peculiarity was noted ; it was found that the hairs on the veins on the under side of the leaf absorbed water more rapidly than those on the spaces between.

The essay concludes with a critical comparison of the stomata of plants that are hairy, and emphasis is laid on the following deduction: "Whenever the hairs or scales form a covering so that a protected layer of air exists between the covering and the epidermis, the stomata are raised, and where the outside air has free communication with the stomata, they are not raised."

Flora Braziliensis. Fascicle xcvii of this stupendous work was issued on April 1st. It contains monographs of the Brazilian Ternstrœmiaceæ by H. Wawra Eques de Fernsee, with 17 plates, the Rhizoboleæ by L. Wittmack with 5 plates, and the Dichapetaleæ by H. Baillon with 4 plates.

Cooke's Illustrations of British Fungi. Parts Nos. 42 and 43 of this fine work, commencing Vol. v., have recently been issued. The genus *Agaricus* is still the subject of illustration, the number of plates having nearly reached 700; the descriptive text is published in "Grevillea"; the number of species of British Agarics described has now reached 577, as shown by the part issued in the September number of that journal.

Baillon's Dictionnaire de Botanique. The 19th and 20th parts of this work, completing Volume ii., have recently been issued, the last genus noted being *Gytonanthus.* A beautifully colored plate accompanies each part; these, however, are not numbered and will be somewhat troublesome to cite.

Photographs of the Fruits of American Plants. Dr. C. F. Millspaugh, of Binghamton, N. Y., has sent us some photographs of the fruits of *Actæa spicata*, var. *alba*, and *Celastrus scandens*, which are intended to be attached to Herbarium sheets. These are especially desirable in species—like those of *Actæa*—whose fruit is difficult to preserve. We hope that Dr. Millspaugh will find it possible to produce photographs of other species and give botanists opportunity to obtain them.

Cypripedium arietinum in China. In a recent number of the Bulletin of the Botanical Society of France, M. Franchet notes the discovery of this plant in the mountains of Yun-nan, Southwestern China. This interesting fact adds another link to the chain of evidence of the common origin of the Eastern North American and Eastern Asiatic Floras.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XIII.] New York, November, 1886. [No. 11.

The Pores of the Libriform Tissue.

By Emily L. Gregory, Ph. D.

The objections against the imbibition theory of the passage of the sap through the cell walls, and the growing favor with which the opposite theory is regarded, namely: its passage through the cell lumina, have suggested a question in regard to some anatomical facts that have hitherto been disregarded. As the theory accounted for the upward movement of the water through the agency of the cell walls of the woody or libriform tissue of the stem, no special interest attached itself to the difference in the form or frequency of the pores of this tissue. Therefore, while the anatomy of the woody tissue has been thoroughly studied and described by various authors, Sanio, Hartig and others, certain points of difference in the libriform tissue have received no mention from these authors, and as these facts appear to have a direct bearing on the theory of water movement through the cell lumina, a brief consideration of them may not be wholly without interest.

A few words of explanation are here necessary to show why a difference in function is inferred from this difference in the anatomy of the pore. Assuming the passage of the sap through the lumina, it is plain that the different elements of the wood (holzkörper) contribute in different degrees to this result; other things being equal, those being most efficacious whose lumina have the greatest diameter. Therefore the tracheæ take the first rank and are supposed to be channels through which the water is passed upward to the leaves, instead of being mere reservoirs of water. Assuming this of the tracheæ, it may be supposed that the thin-walled tracheids have a similar function and rank next in importance, those at least whose walls are so thin that they are of little use as strengthening cells, and which differ from the real tracheæ only by the lack of direct communication with each other, and by their usually smaller diameter. It is well known that some of these tracheids are supplied with peculiar shaped pores whose function is generally conceded to be that of facilitating the passage of some part of the cell contents from one cell to another. Next we come to the tissue forming the subject of the present work, namely: the libriform or thick walled woody tissue. In many instances the cells of this tissue are found to possess pores of the same peculiar shape as those of the thin-walled tracheids. Hence a slight ground for the inference that these cells also serve to a certain extent as water carriers and rank next in importance to the tracheids, the passage of the water being facilitated by the same mechanical construction as in the cells of the latter class. Lastly we come to the remaining cells of the libriform tissue, which are supposed to be of the least importance in this respect, as they are supplied only with simple pores, such as are found in all parts of plant-organs wherever thick-walled cells occur, and where there is no reason for supposing any arrangement specially adapted to the rapid transport of water.

A second and perhaps better reason for this assumption, is the result of various experiments with the wood of coniferous trees, which contains no tracheæ nor thin walled tracheids, but with the exception of the cells of the medullary ray, consists entirely of thick walled tracheids abundantly supplied with these peculiar pores. The experiments of Robert Hartig and others have proved that no considerable amount of water passes through these cell walls, therefore furnishing strong presumptive evidence in favor of the assumption that the passage of water upward from one cell to another, in the case of the tracheids of the conifers, is in some way facilitated by these bordered* pores, which as before stated, correspond exactly in form with the bordered pores of the libriform tissue of dicotyledonous woods.

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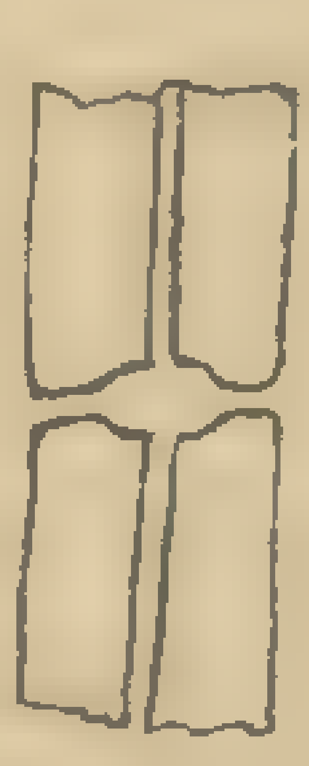
* The word bordered is used here in the sense of the German word behöft, and throughout this article the word border is used for the German word hof, when used with reference to the widening at the extremity of the pore next the outer surface of the cell wall.

Still another reason for supposing a functional difference between bordered and simple pores is founded on the fact, that whenever the libriform cells are used as reservoirs of starch, which is often the case, it has hitherto been found only in those with simple pores. In all the woods examined in the work described in the following pages only two exceptions to this statement were found, and these did not materially weaken the argument used.

An attempt has been made, as here described, to examine the wood of the principal dicotyledonous families, in reference to this characteristic of the libriform tissue and to show; first, to what extent it is possible for it to aid in the process of water-carrying, as shown by the presence or absence of these borders; second, how far this anatomical structure coincides with the morphological characteristics which are made the basis of the present system of classification and serve to determine the limits of genera, families, groups, etc.

It will be necessary at the outset to explain somewhat in detail what principle or definition has been followed in deciding to which class a pore belongs; for though in general, it is very easy to distinguish a bordered from a simple pore, many cases occur where the necessity for a clear and fixed definition is seen. In all thick-walled cells, where simple pores are found, there is, or may be, a tendency to a slight funnel-formed enlargement of the canal at the extremity where the two pores of the adjacent cells meet. The question is, what must be the form of this enlargement to give it the name border? As a test of this, examples were taken from the pores of bast and sclerenchyma cells, where there is no reason for supposing any adaptation to water transport. In many of these pores the canal widens sufficiently to present the appearance of a very small border. If we take, however, the so-called profile view, made either by a cross or longitudinal section through the border, and compare it with the same view of that of the pores of Coniferæ (see figures *a* and *b*) it will be seen that in the former the wall of the canal passes by a curve into this opening, while in the latter, it makes always a distinct angle. This was taken for a test, and in all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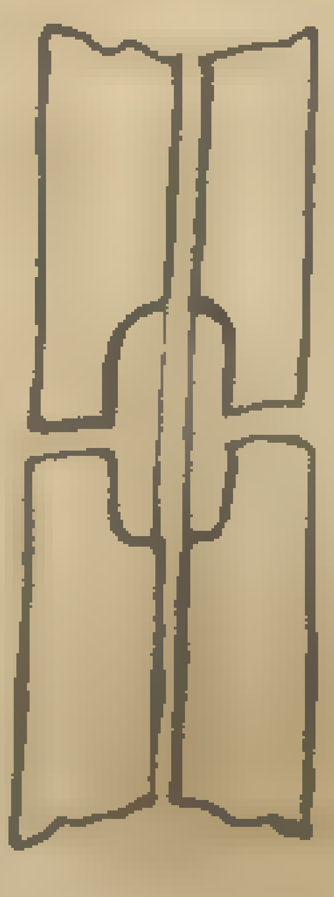

b

cases where a decided angle occurs, the pore is considered bordered (*behöft*). Sanio, in his work on the wood elements (Holzkörper), probably took another standard, as he has in several cases described pores as bordered, which, by this test, must be considered simple; for example—*Fraxinus*, *Betula* and others.

The principal genera of sixty-seven families were examined. Of this number there are only eight families in which the libriform tissue contains both bordered and simple pores, eighteen contain only bordered, and thirty-four only simple pores. The remaining seven families contain genera which do not agree in this respect. These present various points of interest in regard to the parallelism between anatomical and morphological characteristics, therefore they will be referred to more fully in the second part of the work.

If we begin with the most complex type, or that containing the greatest variety of elements, we find this illustrated by the eight families containing both kinds of pores in the libriform. Here we find not only the highest degree of differentiation of tissue, but also the greatest variety of means for water transport, according to the assumption that the greater amount of water is carried through the cell lumen. One example taken from this class will illustrate this and also the manner of arrangement of the tissues, in which is found a supposed adaptation to this function of the bordered pore. We omit here the part supposed to be played by the cells of the medullary ray and wood parenchyma, in the upward transport of water—not because it is less important, but on account of its lack of connection with the present subject; then we have, as before stated, the tracheæ, which take the first rank as water carriers, both on account of their size (diameter) and their open communication with each other; then the thin-walled tracheids, next the thick-walled or libriform cells with bordered pores, next the real libriform cells, or those containing only simple pores. The woody tissue of *Quercus* furnishes a typical illustration containing all these elements with great variation in size. If we make a cross-section extending through the growth of a single year—that is, giving us the picture of the so-called annual ring—we find the elements arranged in the following order:

SKETCH OF THE GROWTH FOR ONE YEAR.

f	CAMBIUM. Libriform, with bordered pores.	Autumn.
e	Libriform, with simple and bordered pores.	Summer.
d	Libriform, with only simple pores.	
c	Libriform, with simple and bordered pores.	
b	Tracheæ and tracheids.	Spring.
a	Spring wood, with only few libriform cells.	

The cells first formed from the cambium in the spring lie next to the inner limit of the annual ring (see *a*), and consist of large tracheæ and thin-walled tracheids with large bordered pores. Next follows zone *b*, in which the tracheæ and tracheids are much smaller in diameter, and the walls of the tracheids perceptibly thicker. In zone *c*, only a few tracheæ occur; the walls of the tracheids here are nearly as thick as in the real libriform cells, and contain bordered pores which diminish in size and frequency toward the middle of the year's ring or the summer's growth. Then follows the zone *d*, which consists almost entirely of thick-walled, simple-pored, libriform cells. This zone varies in size; in the sections examined it averaged between ¼ and ⅓ of the whole width of the year's ring. Then follows another zone, *e*, where the bordered pores again appear, of about the same size and frequency as in zone *c*. Lastly comes the autumn-wood, *f*, in which the pores are all bordered; they lie mostly on the tangential walls, but are not restricted to these; the borders are quite large, often reaching the size of those found in the thin-walled tracheids.

To explain the supposed adaptation here to the transfer of water at such times when the need is greatest, we refer once more to the coniferous woods, with which experiments have been made which verify some of the assumptions regarding the water transport, and furnish a kind of centre around which may be grouped other facts and conjectures. It is well known that the pores of the tracheids of the summer wood of the conifers lie on the radial walls, while those of the autumn wood are found almost exclusively on the tangential walls. It has been suggested that this arrangement is just what might be expected if these pores are designed to facilitate the passage of water. In the early spring, when the building process begins anew, there arises at the same time the necessity for a sufficient supply of water for the new cells, which necessity is met by these pores forming a direct communication with the cambium layer. This in case of the conifers is given only as a suggestion or conjecture; but whatever importance may be attached to it as such, may be applied with equal weight to the wood of *Quercus*, and also to that of the remaining genera of this and the other seven families. In these eight families where both bordered and simple-pored libriform tissue occurs, of which *Quercus* is given as the type, we find the last layers of the summer's growth, the so-called autumn-wood cells, contain bordered pores, nearly all of which are situated on the tangential walls, thus furnishing the same means for the rapid transport of water to the cambium layer in the spring as in case of the conifers. The first cells built in the spring are the large tracheæ and thin-walled tracheids, which arrangement appears also a part of the same plan, as the rapid growth occurring when the leaf-buds develop into leaves, must call for a large and rapid supply of water. Later in the season are built the strengthening cells, real libriform with simple pores, with no special provision for water transport; then in the fall again appear the pores with large borders.

In *Castanea* and *Fagus* the arrangement is the same as in *Quercus*, except that in *Fagus* the zone of simple-pored libriform tissue is very narrow. In the genera examined in Amygdaleæ, this zone is much wider than in any of the above mentioned cases, while in *Spiræa* the case is reversed, the greater part of the year's ring being made up of bordered-pored libriform. In the remaining families, Celastrineæ, Sapotaceæ, Campanulaceæ, and in *Buxus*, it is more difficult to determine the average amount of simple-pored libriform. In Celastrineæ and *Buxus* the greater part of the libriform tissue contains bordered pores. The family Myrtaceæ we have also included in this number, as it contains both kinds of libriform tissue in all the genera examined, with but one exception. In *Myrtus communis* no simple-pored libriform cells were found, though it is possible that they exist, but in such small quantities as to have escaped detection. In this family there is a marked difference in the quantity of the simple-pored libriform in the different genera, and it is difficult to give a very definite order of arrangement of the different layers. In general, it may be said, whenever the libriform of any part of the year's ring contains bordered pores, they are never wanting in the last layers of the year's growth, so that they stand in direct communication with the cambium layer in the early spring.

A few facts of interest in this connection may be mentioned in regard to the size of the border and position of the pores in the nineteen families where only bordered pores occur.

In the genera studied, all variations of size occur between the smallest and largest found. Among the smallest are those of *Erica* and *Tabernæmontana.* The length of the border in *Erica*, as seen in profile, is about 1½ micromillimeters, measured on the cross-section; the longitudinal section averaged a trifle longer, between 1½ and 2 mm. The largest were found in *Syringa*, *Drimys*, and a few others. One of *Drimys* was found to measure 9 mm., but this was an exception, as they average here from 6 to 7½. In *Syringa* they are between 6 and 7 mm. These larger ones compare very fairly with the size of the border in many of the Conifers. For example, those of *Pinus* and *Larix* measure from 7 to 7½ and 8 mm.

Frequently variations were found in genera of the same family, as in case of Ericaceæ, Magnoliaceæ and others, sometimes in the same specimen, as in *Quercus*, where they vary from 3½ to 5 mm., according to their position in the year's ring. One or two instances were found where the borders of the same cell differed in size.

Of all the genera examined in these eighteen families, *Erica* and *Tabernæmontana* are the most interesting, as they furnish the only exceptions thus far found, to the statement before made, that the simple-pored libriform cells are the only ones used as reservoirs for starch. Here the libriform cells contain very small starch grains and are furnished with bordered pores; the borders, however, are so extremely small, that in spite of their perfectly typical form, they can hardly be considered otherwise than as transitional between simple and bordered pores. The family Ericaceæ is also interesting on account of the difference in the size of borders found in its different genera. In *Erica* the border is exceedingly small, in *Calluna* not much larger, in *Ledum* and *Arbutus* a marked increase in size is seen, so in *Andromeda* and *Rhododendron* until at last in *Vaccinium* and *Oxycoccus* the border reaches a medium size; that of *Vaccinium*, in one instance, measuring 5 mm. Only in the genus *Erica* were starch grains present.

In the family Apocynaceæ there is also considerable variation both in the frequency of pores and size of borders, but in the latter case it is much less marked than in the family Ericaceæ. The borders of the genus *Tabernæmontana*, where the starch grains were found, are, if possible, even smaller than those of *Erica*, but perfectly typical in form.

In the majority of instances, the pores were situated on all sides of the cell. Exceptions to this occur in proximity to the limit of the year's ring. Here they are principally on the tangential walls. In a few families they show a decided preference to the tangential walls throughout. In *Drimys* the similarity between their arrangement and that of the pores of conifers is very noticeable. The specimen examined was a one year's stem; the pores are entirely limited to the radial walls, except in the last eight or ten layers next the cambium ring. Here they occur principally on the tangential walls. This genus resembles the conifers also in the size and frequency of the borders, and in the predominance of this tracheal element.

Of the thirty-three families containing only simple pores in the libriform tissue no special mention is necessary except as regards one point. Whatever may be the functional differences in the elements of the woody tissue, the extreme contrast between the most complex and simple forms suggests some plan for the division of labor in the more complex. If, as some authors have suggested, the office of the tracheæ is to supply the need of water in the leaves, caused by transpiration, while that of the tracheids is to supply the local demands, which exist in all living parts of the stem, it might be inferred, that in those cases where the libriform has only simple pores, there would be found thin-walled tracheids, and in cases where the libriform was liberally supplied with bordered pores, the other tracheal element would not be apt to occur in such large quantities.

(*To be continued.*)

A Preliminary List of North American Species of Cyperus, with Descriptions of new Forms.

BY N. L. BRITTON.

(A) Sub-genus PYCREUS, Beauv.

* *Umbel simple or capitate, rarely slightly compound.*

† Superficial cells of the achenium oblong.

1. *Cyperus flavescens*, L. Canada to Texas throughout eastern North America; also in northern Mexico, Brazil, southern Europe, northern Africa and western Asia.

† † Superficial cells of the achenium quadrate.

2. *C. diandrus*, Torrey. Throughout eastern North America, extending westward to Arkansas and New Mexico. (Fendler, No. 869.)

Var. *castaneus*, Torrey. (*C. Elliottianus*, Rœm. and Schultes, Mant. ii., p. 100.) With the type. I cannot agree with Mr. C. B. Clarke, (Journ. Linn. Soc., xxi., p. 65) in regarding this plant as a distinct species under the name *C. rivularis*, Kunth. The varieties *eluta* and *depauperata* which he proposes (l. c.) are, in my opinion, but forms of the variable *C. diandrus*. There is still another form, characterized by elongated spikelets, which has been collected by Hunter in Lincoln Co., N. C., and by Leggett at Summit, N. J.

Var. CAPITATUS, n. var. Inflorescence a single capitate cluster appearing somewhat lateral; involucre of one or two elongated leaves with one or two bracts; glumes generally brown-margined. Texas and northern Mexico to California. Here I include the var. *castaneus* of Watson in Botany of California, ii., p. 214; No. 1949 of C. Wright's New Mexican Collection, and No. 49a of Dr. Palmer's Chihuahuan Collection of 1885.

3. *C. bipartitus*, Torrey. New Orleans, La., (Dr. Ingalls in Torrey Herbarium.) This appears to be distinct, but more specimens are needed to establish its relationship; it may be but a single-spiked form or variety of *C. diandrus*.

4. *C. Nuttallii*, Eddy in Spreng. Neue Entdeck., i., p. 240; Torrey. In salt meadows along the Atlantic and Gulf coasts (Curtiss, N. A. Plants, 3050.) For synonomy see Torrey, Ann. Lyc., iii., p. 252. *C. Cleaveri*, Torrey, is but a depauperate, single spiked form, of this species.

5. *C. Olfersianus*, Kunth. Umbel very simple, 1 to few-rayed; heads composed of few straw-colored spikelets; achenium oblong, its surface marked with quadrate cells; otherwise resembling *C. flavescens.* Plaquemines Co., La., (A. B. Langlois, 1882); Mexico, West Indies and eastern South America.

6. *C. polystachyus*, Rottb. New Orleans, (Torrey Herbarium; an old specimen.) Widely distributed in tropical regions.

Var. *leptostachyus*, Bœckl. (*C. microdontus*, and *C. Gatesii*, Torrey, *C. Texensis*, Steud.) Virginia to Florida (Curtiss, N. A. Plants, No. 3049, part), and Texas, (E. Hall, 676.)

7. *C. leucolepis*, Carey, MS., fide Clarke l. c., p. 61, (not of Bœckl.; *C. divergens*, Chapm., not of HBK.) Quincy, Florida. Related to *C. pumilus*, L., of India.

8 *C. unioloides*, R. Br., var. *bromoides*, Clarke. Spikelets much larger than in any of the foregoing species, straw-colored. Cienaga, Los Angeles Co., Cal., (J. C. Oliver in Gray Herbarium); Mexico, West Indies and South America; the type in Australia.

* * *Umbel compound.*

9. *C. flavicomus*, Vahl, Torrey, Ann. Lyc., iii., 253, Bœckeler, not of Michaux. which, according to Mr. Clarke (l. c., p. 71), is *C. strigosus*, L. Virginia to Florida; also in Brazil.

10. *C. Hochstetteri*, Nees. (*C. flavicomus*, Torrey, Bot. Mex. Bound. Survey.) Glumes dark reddish brown; achenium broadly ellipsoidal, twice or three times the size of that of the foregoing species, which it otherwise resembles. Louisiana (Hale); Texas and New Mexico (C. Wright, No. 1965); also in tropical America, Australia, India and Africa.

(B) Sub genus JUNCELLUS, Griseb.

11. *C. lævigatus*, L. Southern California (Brewer, Lemmon, Wright, Parish, No. 1050.) Widely distributed in tropical regions.

(C) Sub-genus EUCYPERUS, Clarke.

Section 1. *Aristati*, Kunth.

* *Spikelets digitate.*

12. *C. amabilis*, Vahl. (*C. aureus*, *aurantiacus* and *oligostachyus*, HBK; *C. glareosus*, Liebm.) Sanoita Valley, southern Arizona, (Rothrock, No. 599, in Expl. and Surveys West of

100th Meridian, under *C. Nuttallii*); Mexico, (Dr. Palmer, No. 49b, 1885); also in the West Indies, South America, eastern India and Africa.

* * *Spikelets in dense terminal clusters.*

13. *C. aristatus*, Rottb. (*C. inflexus*, Muhl; *C. confertus*, Chapm., S. Flora, not of Swartz.) Throughout North America, but local. (E. Hall, Pl. Oreg., 557, and Pl. Tex., 677.) Dr. Chapman's specimens from South Florida, marked *C. confertus*, differ mainly in the reddish-brown glumes, which is the character given by Clarke (l. c., p. 92), for his forma *versicolor*. The species is widely distributed in temperate and tropical regions, not, however, occurring in Europe.

14. *C. sesleroides*, HBK. Sanoita Valley, southern Arizona, (Rothrock, No. 614, Expl. and Surveys West of 100th Meridian); also in Mexico, Hartweg, No. 256; Liebmann; Parry and Palmer, Nos. 910, 911 and 911½; Chihuahua, Dr. E. Palmer, No. 49¾, 1885, named by me *C. spectabilis*, which appears to be a totally different plant. Specimens from various other Mexican localities in the Gray Herbarium very closely resembling those here cited are determined as *C. divergens*, HBK., which nearly related, if not identical species Bœckeler and Clarke refer to *C. spectabilis*, Schreb. Following these authorities I was led into error in my determination of Dr. Palmer's plant.

Section 2. *Compressi*, Kunth.

15. *C. compressus*, L. Maryland and southward along the Atlantic and Gulf coasts to Texas (Curtiss, N. A. Plants, No. 3026; E. Hall, Pl. Tex., 682); also in ballast at Camden and Philadelphia; Mexico and Central America and in the warmer portions of Asia and Africa.

16. *C. Rusbyi*, Britton in Bull. Torr. Bot. Club, xi., p. 29. Near Silver City, New Mexico, Dr. H. H. Rusby, 1880.

17. *C. Buckleyi*, Britton. Valley of the Lower Rio Grande, (Buckley); rocky hills near Chihuahua (Pringle, Plantæ Mex., 1885, No. 311); Indian Terr. (E. Palmer, 347).

18. *C. Schweinitzii*, Torrey. Western Pennsylvania and Canada to Texas and Arizona (Lemmon, No. 2905); westward to the Pacific coast, extending north to Oregon (Geyer); also in Mexico, (Parry and Palmer, 907).

Var. DEBILIS, n. var. Much smaller and more slender, about 6-8 inches high; inflorescence very simple; spikelets few flowered; glumes blunt, strongly nerved. Arizona and New Mexico (C. Wright, No. 1944; Rusby, No. 430, Coll. of 1880); also in Mexico (Bourgeau, No. 529.)

19. *C. Fendlerianus*, Bœckl. Texas, Arizona and New Mexico (Fendler, No. 865; C. Wright, No. 1945; Rusby; Matthews; also Hall and Harbour, Rocky Mountain Flora, No. 584,)

Section 3. *Viscosi*, Clarke.

20. *C. viscosus*, Aiton. (*C. trachynotus*, Torrey.) Florida to New Mexico (Nos. 1943 and 704, C. Wright; No. 1515, Mex Bound. Survey); Mexico, West Indies and northern South America.

Section 4. *Luzuloidei*, Kunth.

21. *C. Luzulæ*, Rottb., var. UMBELLULATUS, n. var. (*C. vegetus*, Pursh, Muhlenberg, Elliott, Torrey, Chapman, &c., not of Willd.; *C. virens*, Gray, Manual, not of Michaux; *C. distinctus* and *pseudo-distinctus*, Steud.); Delaware (Canby) to Florida (E. Palmer, No. 586, 1874), and westward through the Gulf States to Texas (Lindheimer, No. 201), the Indian Territory and Arkansas. Differs from the type mainly in the compound inflorescence. Specimens received from Mr. Ravenel, collected at Aiken, S. C., closely approach the type, which occurs in Mexico, the West Indies and South America, (Mart. Herb. Flor. Brazil, No. 245.)

22. *C. virens*, Michx. North Carolina to Florida (Curtiss, N. A. Plants, No. 3062), and westward through the Gulf States to Texas (E. Hall, No. 680); also in Mexico and Guatemala, (fide Hemsley); California (vide Watson, Bot. Cal., ii., p. 214.)

23. *C. Surinamensis*, Rottb. (*C. Drummondii*, Torrey); Florida, (Curtiss, N. A. Plants, No. 3032) to Texas; in ballast grounds, Camden, N. J., (Parker); also in Mexico, the West Indies and South America.

24. *C. ochraceus*, Vahl. (*C. formosus*, Vahl (?), vide Torrey in Ann. Lyc., iii., p. 269; *C. aureus* (?), Britton in Bull. Torr. Bot. Club, xi., p. 85) Abbeville, La. (Langlois, distributed as No. 855c); Texas (Buckley), and in the West Indies and Mexico (Botteri, Nos. 739, 740); Mex. Bound Survey, No. 1519.

25. *C. serrulatus*, Watson. Placer Co., Cal., G. R. Vasey; Alta, Cal., Pringle; Sacramento, M. E. Jones, Flor. Cal., 3530.

26. *C. reflexus*, Vahl. (*C. rufescens*, Torr. and Hook.) Texas, (Drummond; E. Hall, No. 679, in part; Wright; Nealley.) Specimens recently received from Mr. Nealley show that the scales are not always red, and that the spikelets may be as many as 30-flowered.

27. *C. cyrtolepis*, Torr. and Hook. Texas (Drummond, Wright, Mex. Bound. Survey, No. 1520, E. Hall, 678 in part, Buckley, Reverchon); Camp Grant, Arizona, (Rothrock, Exp. and Surv. W. of 100th Merid., 390); Indian Terr., (Palmer 351.)

Var. DENTICARINATUS. (*C. rufescens*, var. *denticarinatus*, Britton in Bull. Torr. Bot. Club, xi., p. 85.) After a re-examination of Mr. Buckley's specimens from the valley of the lower Rio Grande, I am convinced that they belong rather to this species than to *C. rufescens*.

28. *C. acuminatus*, Torr. and Hook. Illinois and Tennessee to Louisiana, Kansas and Arizona; also collected by Howell (No. 567) along the Columbia River in Oregon, and by J. W. Congdon in Tulare Co., Cal. A form of this species collected by E. Hall at Hempstead, Texas (Pl. Tex., 679), has dense heads of many spikelets.

Section 5. *Haspani*, Kunth.

29. *C. Haspan*, L. Virginia, North Carolina (Curtis, Canby), to Florida (Curtiss, N. A. Plants, No. 3041), and westward to Texas (E. Hall, No. 683); also occurring in Mexico, the West Indies, South America, Africa, Asia and Australia.

30. *C. dentatus*, Torrey. Cumberland Co., Maine (J. Blake), Rhode Island and northern New York (Leggett), to South Carolina, mainly near the Atlantic coast, but extending westward to West Virginia (Mertz.)

31. *C. Lecontei*, Torrey. Florida (Curtiss, N. A. Plants, No. 3045) to Louisiana.

Section 6. *Fusci*, Kunth.

32. *C. lateriflorus*, Torrey. East of Santa Cruz, Sonora, (C. Wright, No. 1950.) Not since collected. The species is nearly allied to *C. difformis*, L., of the tropical regions of the Old World, and may be the same.

33. *C. Iria*, L. Santee Canal, South Carolina (Ravenel; Curtiss, N. A. Plants, No. 3043.) According to Dr. Chapman it was probably introduced from eastern Asia, where, as elsewhere in warm-temperate countries, it is a noxious weed in rice fields.

34. *C. fuscus*, L. In ballast sand, Camden (Parker); Revere Beach, Mass. (H. A. Young, in Gray Herbarium.) Adventive.

Section 7. *Glomerati*, Clarke.

35. *C. cephalanthus*, Torr. and Hook. Texas (Drummond, 3d Coll., No. 445); Louisiana (Carpenter, Langlois.)

36. *C. spectabilis*, Schreb. Texas (Drummond, in Calcutta Herbarium, fide Clarke, l. c., p. 142.) Arizona, (Rothrock, 600 and 601, in Expl. and Surveys W. of 100th Meridian.) (See No. 14 of this List.)

37. *C. distans*, L. Eastern North Carolina (Gerald McCarthy, 1885.) The species was recorded from the same region by Pursh (Flor. Amer., Sept., i., p. 53) and its rediscovery by Mr. McCarthy confirms Pursh's statement that it grows "in wet woods, Carolina and Georgia." It is widely distributed in tropical countries.

Section 8. *Corymbosi*, Kunth.

* *Culm jointed, leafless.*

38. *C. articulatus*, L. South Carolina and Florida (Curtiss, N. A. Plants, No. 3024) to Texas along the Gulf Coast (E. Hall, No. 703.) In all tropical regions.

Var. *conglomeratus*, Britton. Valley of the lower Rio Grande (Buckley.)

A form of this species with the spikelets greatly elongated has been collected by Mr. Nealley in Texas.

* * *Culms leafy.*

† Perennial by tuberiferous stolons.

39. *C. rotundus*, L. North Carolina to Florida (Curtiss, N. A. Plants, No. 3055) and Texas (E. Hall, 684); also in ballast grounds at Jersey City (Brown), Philadelphia and Camden (Parker), and at Port Eads, La., (Langlois); throughout the warmer regions of the globe. For synonymy see Clarke, l. c., p. 162.

40. *C. esculentus*, L. (*C. phymatodes*, Muhl.; *C. repens*,

Ell.) New Brunswick (Fowler) and Wisconsin to Florida (Curtiss, N. A. Plants, No, 3052) and Texas throughout eastern North America; westward to California and extending northward along the Pacific coast to Alaska (J. O. Rainer, 1871); also in Mexico, South America, southern Europe to the Cape of Good Hope, and in Australia.

Var. *macrostachyus*, Bœckl. (*C. lutescens*, Torr. and Hook, Ann. Lyc., iii., 433). Florida (Chapman), Texas (C. Wright, 1849, No. 705; Drummond, 3d Coll., No. 452), San Diego, Cal., (Orcutt, No. 1314.)

Var. ANGUSTISPICATUS, n. var. Spikelets narrowly linear, about one line wide and three-fourths of an inch long; a well-marked form. Kentucky (Short), Missouri (H. Eggert), Washington, D. C., (Vasey), Lexington Co., S. C., (J. Donnell Smith.)

Var. HERMANNI. (*C. Hermanni*, Buckley; *C. phymatodes*, var. *Hermanni*, Watson). Kern River, Cal., (Blake, in Torrey Herbarium); Bank of San Joaquin (Lemmon, Flor. Cal., 1509.)

41. C. HALLII, n. sp. Culm triangular, 2 to 3 feet high; leaves elongated, 2 to 3 lines wide; involucre of several leaves, one of them elongated far beyond the others and reaching a length of a foot or more; umbel more or less compound, of 5 or 6 elongated rays and several shorter ones; involucels setaceous; spikelets linear, 9 to 15-flowered, arranged in loose heads; glumes ovate, acute, strongly 7 to 9-nerved, dark reddish-brown, with lighter colored margins and apices; achenium triangular, linear. Rootstocks scaly.

Texas (E. Hall, Pl. Tex., No. 685, distributed as *C. phymatodes*, var.); valley of the lower Rio Grande (Buckley); Indian Territory (E. Palmer, No. 353).

† † Annual or perennial; roots fibrous, but stems often hard and corm-like at the base.

42. *C. strigosus*, L. (*C. Michauxianus*, Schultes, not of Torrey, fide Bœckeler; *C. flavicomus*, Michx., not of Vahl; *C. stenolepis*, Watson, Bot. Cal., not of Torrey.) Canada and Minnesota to Florida (Curtiss, N. A. Plants No. 1820, distributed as *C. stenolepis.*) and Texas, throughout eastern North America; also in California. Among the many forms of this variable species I think the following may be distinguished:

Var. *robustior*, Kunth, Enum., ii., p. 88. Spikelets large, elongated, 10 to 25-flowered. With the type.

Var. *capitatus*, Bœckl., Linnæa, xxxvi., p. 347. Inflorescence of several capitate clusters, rays short. Indiana (Dr. Clapp, 1838); St. Louis, Mo., (Engelmann); Illinois (Dr. Schneck); Massachusetts (Morong); Camden, N. J., (Martindale); Texas, (Bigelow.)

Var. COMPOSITUS, n. var. (*C. strigosus*, var. Torrey, Ann. Lyc., iii., p. 262.) Umbel compound; spikelets one-third to one-half inch long, 4 to 5-flowered. Astoria, Long Island (Leggett); Pennsylvania and New Jersey to Alabama.

Var. GRACILIS, n. var. Slender, leaves shorter than the culm, umbel of 1–3 short rays, bearing few, linear, spreading spikelets. Valley of the Lower Rio Grande (Buckley); Fayetteville, Ark., (Harvey.)

Var. ELONGATUS. (*C. Michauxianus*, var. (?) *elongatus*, Torrey, Ann. Lyc., iii., p. 432 (?). Rays much elongated, bearing single, capitate clusters. North Carolina (Curtis, in Torrey Herb.) The originals of Dr. Torrey's variety were collected by Drummond in Texas, but there are no specimens from there in his herbarium, and I have no means of knowing if they are the same as the one from North Carolina on which the present variety is based.

43. *C. stenolepis*, Torrey. North Carolina to Florida and Texas.

44. *C. setigerus*, Torr. and Hook. (Including *C. lutescens*, Torrey, Bot. Mex. Bound. Survey, p. 227, and Herbarium.) Texas and New Mexico (C. Wright, No. 705; Buckley; Bigelow, and Herb. Berland. Texano-Mexicanum, Nos. 2410 and 980.) I can see no reason for keeping the two species separate, and Dr. Torrey states (l. c.) that his *C. lutescens* is probably too close to *C. setigerus.*

45. *C. sphacelatus*, Rottb. Southern Nevada (Lieut. Wheeler, 1871, in Gray Herbarium); Cal. (Parish); ballast, Mobile, Ala., (Mohr.); the specimens almost exactly match the others from St. Thomas, W. I. (Eggers), and No. 636, Sagot, Guyane Francaise. Resembles the last, but the glumes are brown-margined.

46. *C. refractus*, Engelm. (Bœckeler, in Linnæa, xxxvi., p. 369; see also Vasey, in Bull. Torr. Bot. Club, x., p. 32.) Trenton, N. J., to North Carolina and Missouri. Appears to me nearest allied to *C. strigosus*, but is also related to *C. Lancastriensis*, Porter.

47. *C. filiformis*, Swartz. Southern Florida; also in the West Indies. The Florida specimens do not quite agree with C. Wright's from Cuba.

48. *C. brunneus*, Swartz. (*C. purpurascens*, Vahl; *C. ligularis*, Chapm., S Flora, p. 507, not of L. nor of Chapm. Suppl., p. 659.) Southern Florida (Curtiss, N. A. Plants, No. 3025*), and in the West Indies.

49. *C. tetragonus*, Ell. North Carolina and Florida (Curtiss, No. 3059) to Texas; also in Mexico (fide Hemsley.)

50. *C. dissitiflorus*, Torrey. Florida to Louisiana and Texas. (E. Hall, Plantæ Texanæ, No. 690, distributed as *C. litos*, Schultes); also in Mexico and Brazil (fide Bœckeler.)

Section 9. *Papyri*, Kunth.

51. *C. giganteus*, Vahl. (*C. erythrorhizos*, Muhl., var. *erectus*, Britton, in Bull. Torr. Bot. Club, xi., p. 85; *C. densiflorus*, Meyer.) Texas and Mexico (Herb. Berland. Texano-Mexicanum, Nos. 876, 3223 and 2306; Buckley; Nealley.) Cuba (C. Wright, No. 1529.)

52. *C. erythrorhizos*, Muhl. Lawrence, Mass., (Robinson); Hartford, Conn., (fide Bishop, Cat. Plants Conn., p. 17); eastern Long Island (E. S. Miller); Camden, N. J., (Martindale), and southward to Florida and New Mexico; also in California.

Var. *pumilus*, Engelm. (*C. occidentalis*, Torrey.) Missouri to California, extending northward to Oregon (E. Hall, Pl. Oreg., No. 558), and Washington (Suksdorf, 221.)

53. C. HALEI, Torrey, ined., in letter to Mr. Charles Mohr, 1868, who has kindly furnished me with the following description:

Umbels many-rayed, shorter than the involucral bracts; spikes cylindrical, one-half to three-fourths inch long, sessile or stalked, forming dense clusters with a few linear, acuminate involucels; spikelets flat, 12 to 14-flowered; scales with scarious margins, brown, sharply carinate on the back, indistinctly

5-nerved, blunt, mucronulate, somewhat appressed; stem 2 to 3 feet high, obtusely triangular, tumid at the base; leaves as long as the stem, broadly linear, very rough on the edges; achenium small, triquetous. Marshes and borders of lakes in the Red River Valley, Repides, La., (Hale); eastern Florida (Leavenworth); Carrabelle, Florida.

(D) Sub-genus DICLIDIUM, Nees.

54. *C. speciosus*, Vahl; Torrey in part. (*C. Michauxianus*, Torrey, not of Schultes.) New England to Wisconsin, and southward to Florida (Curtiss, N. A Plants, No. 3048) and Texas (C. Wright, 1849, No. 706); also in California.

Var. SQUARROSUS, n. var. (*C. ferruginescens*, Bœckl.) Scales spreading or recurved, reddish. New Mexico (Fendler, No. 870); St. Louis, Mo., (Engelmann); Texas (Buckley.)

Var. PARVUS, n. var. (*C. parvus*, Bœckl.) Low, 1 to 3 inches high; umbel very simple, generally of a single cluster of short terete spikelets. Cited by Bœckeler as collected by Dr. Engelmann at St. Louis, and Drummond's Collection, No. 34; No. 1946, C. Wright, New Mexico, answers Bœckeler's description.

55. *C. ferax*, Richard. (*C. flexuosus*, Vahl; *C. pennatus*, Bœckl., not Lam.) Missouri (F. Bush); Texas (Bigelow, Buckley); Arizona (Pringle); California (Parish, 1064); West Indies and widely distributed in tropical regions. For synonomy see Clarke, Journ. Linn. Soc., xx., p. 295.

56. *C. Engelmannii*, Steud. Massachusetts (Morong) to Wisconsin and southward, but not often collected.

57. *C. oxycarioides*, Britton, in Bull. Torr. Bot. Club, xi., p. 86. Valley of the lower Rio Grande (Buckley.)

(E) Sub-genus MARISCUS, Vahl.

* *Umbel simple or capitate.*

† Spikelets few (2 to 6), flowered.

58. *C. ovularis*, Torrey. Southern New York to Illinois and southward; westward to Arkansas and Texas.

Var. *robustus*, Bœckl. Heads larger, 6 to 8 lines in diameter, on longer rays; spikelets 3 to 6-flowered. (*C. Wolfii*, Wood, in Bull. Torr. Bot. Club, vi., p. 72.) Illinois (Bebb; J. Wolf);

Arkansas (Harvey); Indian Territory (G. D. Butler); Louisiana (Langlois).

Var. *sphæricus*, Bœckl. Heads smaller than in the type, very dense; spikelets more subulate, reddish brown. Arkansas (Dr. Pitcher); Indian Territory (Dr. Palmer, No. 348); Texas (Wright) and Herb. Berland. Tex. Mex., Nos 314, 1568 and 1574.)

59. C. TORREYI. (*Mariscus cylindricus*, Ell.; *C. ovularis*, var. *cylindricus*, Torrey; *C. cylindricus*, Britton, l. c. vii., p. 48, Plate III., not of Chapman.) Long Island (Leggett) to Florida (Curtiss, N. A. Plants, No. 3051), and westward to Texas (Palmer, Flor. S. W. Texas, No. 2017.)

60. *C. retrorsus*, Chapm. in Bot. Gazette, iii, p. 17; *C. retroversus*, Chapm., Suppl., p. 659; *M. alternifolius*, Vahl.) Robert's Key, Caximbas Bay, southern Florida (Chapman); also in Mauritius.

61. *C. retrofractus*, Gray. Southern New Jersey to Florida (Curtiss, No. 3053), and Texas (E. Hall, Plantæ Texanæ, No. 691.)

62. *C. flavomariscus*, Griseb., Flor. Brit. W. I., p. 567. (*Mariscus flavus*, Vahl; *C. flavus*, Bœckl.) Valley of the lower Rio Grande (Buckley); Monterey, Cal. (?), vide Watson, Bot. Cal., ii., p. 216; in ballast at Philadelphia and Camden (Parker, Burk); also in Mexico, the West Indies and South America.

Var. PEDUNCULARIS, n. var. Rays of the umbel elongated, with setaceous involucels. Chihuahua (Dr. E. Palmer, No. 49, 1885; Mandon, Plantæ Andium Bolivensium, No. 1398.)

63. *C. cylindricus*, Chapm., not of Britton. Colier's Key, Marco Pass, South Florida (Chapman.)

64. *C. uniflorus*, Torr. and Hook. Texas (Drummond, Wright, E. Hall, No. 686, Reverchon, Nealley.)

Var. *pumilus*, Britton. Indian Territory (Dr. Palmer, No. 350); valley of the lower Rio Grande (Buckley.)

65. C. WRIGHTII, n. sp. Culm slender, triangular, 12 to 15 inches high; leaves of the culm few, narrowly linear; root leaves not seen; involucre of one elongated leaf, and 2 to 4 shorter ones; umbel simple, of 1 to 3 short rays; inflorescence of 1 to

3 dense ovate heads, about half an inch long; spikelets lanceolate, 4 to 5-flowered; glumes lanceolate, acute; achenium ovoid, triangular.

New Mexico (C. Wright, No. 1947); Mexico (F. Müller, without a number).

†† Spikelets several (4 to 12) flowered.

66. *C. filiculmis*, Vahl. Northumberland Co., Canada (Macoun), to Wisconsin and southward to Florida (Curtiss, No. 3036) and Texas. Varies into very slender forms with small, single heads.

67. *C. Grayii*, Torrey. (*C. setifolius*, Torrey MS., and Clarke, l. c., xxi., p. 198.) Sandy plains along the Atlantic coast, Massachusetts to Florida. *C. ovularis*, var. *tenellus*, Torrey, Ann. Lyc., iii., p. 279, is a young form of this.

68. *C. Baldwinii*, Torrey. North Carolina and Florida, (Curtiss, No. 3025) westward to Texas (E. Hall, No. 687; E. Palmer (Flor. S. W. Texas, No. 1332); also in ballast at Camden (Parker.)

69. *C. Lancastriensis*, Porter. Trenton, N. J.; Safe Harbor, Penn., (Porter) to Alabama.

70. *C. fuligineus*, Chapm. Key West (Chapman; Garber.)

* * *Umbel compound.*

71. *C. Californicus*, Watson. (*C. speciosus*, Torrey, Bot. Mex. Bound. Survey.) California (Fitch, in Torrey Herb.)

72. *C. Pringlei*, Britton. Catalina Mountains, southern Arizona (Pringle.)

73. *C. ligularis*, L. (Not of Chapm., S. Flora, p. 507.) Southern Florida (Palmer, 1874, No. 532; Curtiss, N. A. Plants, No. 3046); also in Mexico, the West Indies, South America and tropical Africa and Australia.

Some Californian Polypetalæ.

BY E. L. GREENE.

DENDROMECON FLEXILE.—Six to ten feet high, tree-like, with numerous more or less drooping branches; leaves ovate-oblong to elliptical, obtuse, often mucronulate, 2 to 5 inches long, fleshy and glaucous, crowded on the branches, short-petioled, their margins smooth and revolute; corolla rather pale yellow, 2 inches in diameter, on a short pedicel; capsules stout, curved, 3 to 5 inches long; seed large, spherical, lightly scrobiculate, with a large amber colored caruncle.

A common large shrub of the island of Santa Cruz, very strikingly unlike either the original mainland species, or that of the neighboring island of Santa Rosa. The large, pallid, somewhat succulent leaves are so numerous as to weigh down the branches, and this gives the shrub a rather graceful appearance; when dry they are thinner and softer than in the other species. In their axils the leaf-buds appear as solid, pyramidal, thorn-like protuberances, another singular characteristic.

DENDROMECON HARFORDII, Kellogg. This low shrub of Santa Rosa Island I have not seen growing. It is more like *D. rigidum* than the new one above characterized; but its very broad, entire leaves and short-peduncled flowers, short, stout branches and low, spreading habit, doubtless entitle it to the rank of a named variety, at least; and most probably it will eventually prove itself a good species.

ESCHSCHOLTZIA RAMOSA.—Annual, a foot high, stoutish, glabrous and very glaucous; stem simple at base, but above compactly branching; leaf-segments numerous, strongly divergent, or even divaricate; corolla a half inch or more in diameter, light greenish yellow; torus cylindrical, with no rim, but an erect, double margin; pod 3 inches long, stout and straight; seed globular, reticulated. *E. elegans*, var. *ramosa*, Greene, Bull. Cal. Acad. i., 182.

A strictly insular species, first found by the writer on Guadalupe, then on San Clemente, by Mr. W. S. Lyon, and lastly, this year on a small rocky islet occupied by sea birds, very close to the northern shore of Santa Cruz. This exceedingly well marked *Eschscholtzia* differs from all others in its compact, tree-like habit. All the rest, except *E. elegans*, have a loose, straggling mode of growth, branching from the very ground, with scarcely any part of the plant erect. *E. elegans*, to which I at first referred it as a variety, has different foliage, large deep yellow flowers, and smaller, curved pods, besides elongated and smoother seeds. It lacks, moreover, that singular dendroid compactness which is characteristic, as I have said, of the present plant alone, of all the genus.

PLATYSTIGMA DENTICULATUM. (*Meconella denticulata*, Greene, Bull. Cal. Acad. ii., 59.)

Field studies of the past season have brought to light facts in abundance to show that it is of little importance in our Papaveraceæ. whether filaments be flat or filiform. The same species will sometimes be found to vary greatly in this respect; and we have even *Platystigma* with filaments as broad and flat as they are ever found in *Platystemon* itself. *Meconella* has, therefore, nothing but its twisted capsules to recommend it for generic rank; and the Benthamian view of the limits of *Platystigma*, adopted by Mr. Watson in the Botany of California, is probably the more correct.

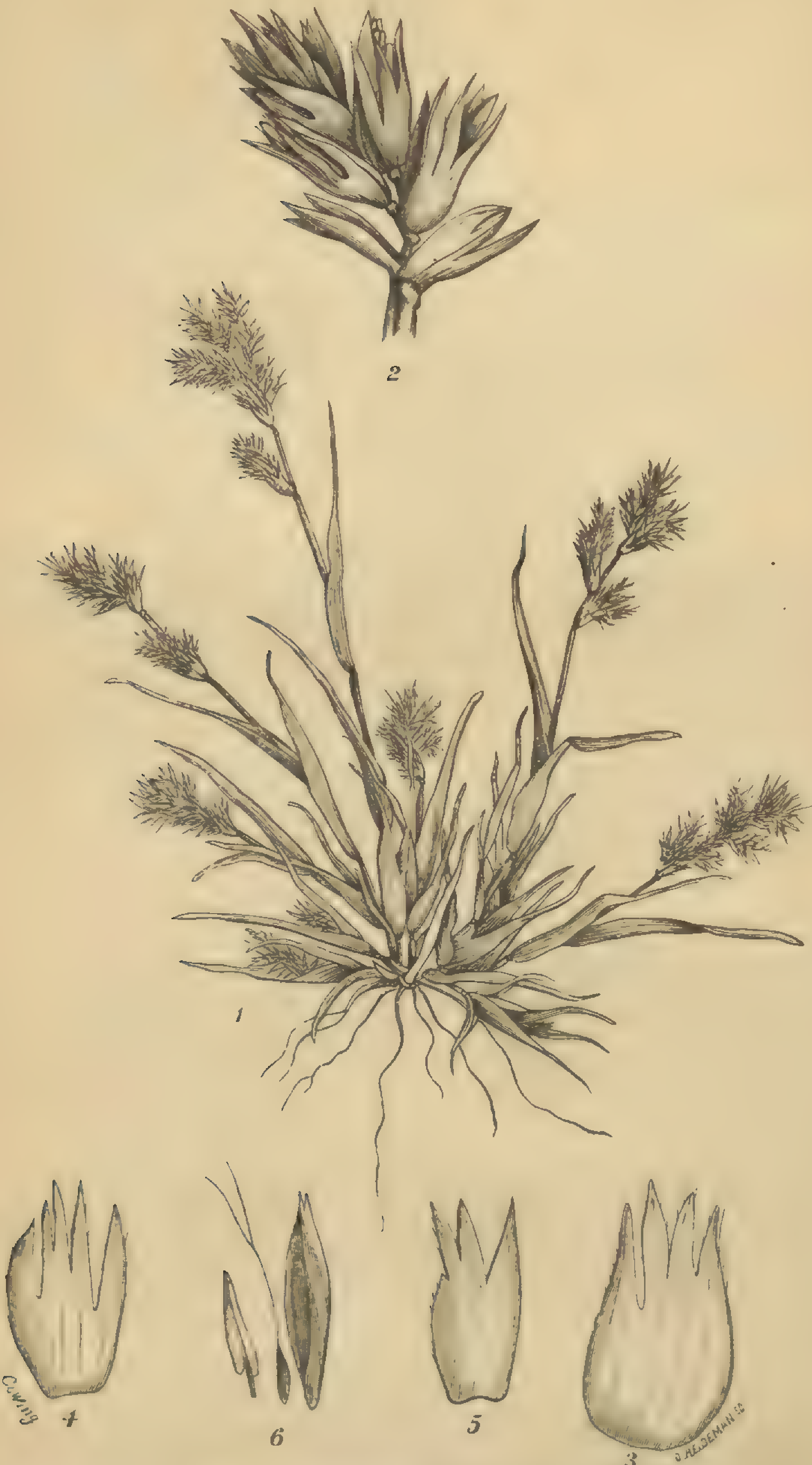
THYSANOCARPUS CONCHULIFERUS.—Glabrous, 3–7 inches high, with many divergent branches; leaves linear, the lower cleft into narrow segments, the cauline auricled at base; racemes short and rather close; pods a line or more in length, cymbiform, the conduplicate margin sinuately parted into spatulate divisions, or the latter coherent above, leaving narrowly oblong perforations; style equalling the margin of the pod and commonly coherent with it; pedicels nearly divaricate or quite straight, twice as long as the pods; flowers not seen.

Common on mossy shelves and crevices of the high rocky summits and northward slopes of Santa Cruz Island. A most interesting new species, very remarkable in the character of its fruit; showing how nearly our American *Thysanocarpus* can approach the Asiatic genus *Tauscheria* and yet remain a perfectly valid genus, the very dissimilar *Athysanus* being excluded.

ERYSIMUM INSULARE.—Shrubby, diffuse, a foot high, forming a dense tuft of from 2 to 6 feet broad, cinereous with a minute appressed pubescence, or glabrate; leaves narrowly linear, canaliculate, entire, rather rigid, recurved at apex, crowded upon the numerous woody branches; racemes short and dense, on short peduncles, or almost sessile; corolla yellow, a half inch broad; siliques quadrangular, 2 inches long, 1½ to 2 lines thick, beaked with a stout style.

Sandy slopes above Cuyler's Harbor, Island of San Miguel. A very remarkable plant, apparently related to certain Old World

Bulletin Torrey Botanical Club. Plate LX.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Orcuttia Californica, Vasey.

species, and most unlike any other American *Erysimum*. It is a broad, matted, evergreen shrub, the dead foliage of one or two preceding seasons firmly persistent still, on all the branchlets. Our specimens are mostly in leaf only, the flowering season having been perhaps six months past. One specimen was found partly in flower, and with a few clusters of well matured pods which had not yet shed their seeds.

A New Genus of Grasses.

BY DR. GEO. VASEY.

(PLATE LX.)

Orcuttia.—Tribe FESTUCEÆ, Sub-tribe SESLERIEÆ. Panicle simple; spikelets sessile, alternate, many flowered, compressed, upper ones crowded; empty and flowering glumes much alike, green and thickish, broad, 3 to 5-lobed, unawned, strongly many nerved; palet equaling its glume, hyaline, nar now, green on the strongly angled keels; anthers 3, styles 2, filaments and styles at length projecting beyond the flower.

O. CALIFORNICA.—Plant dwarf, 2 to 4 inches high, annual; growing in small clusters of 10 to 20 or more culms from one root; culms variable in length in the same cluster, generally producing some small flowering branches from the lower joints; leaves 2 or 3, the sheaths open and inflated, striate; ligule obsolete; blade rather rigid, about 1 inch long, acuminate; leaves and sheaths sparsely pubescent; panicle about 1 inch long, simple, usually of 4 to 6 alternate sessile spikelets, the lower 2 or 3 rather distant, the upper ones crowded; spikelets 5 to 10 flowered, empty glumes sparsely pubescent, broad, about 2 lines long, scarious-margined, mostly 3 lobed, the 2 outer lobes longer, the lobes each three-nerved; flowering glumes a little exceeding 2 lines long, with 5 nearly equal, acute lobes, each lobe three-nerved; palet as long as its glume, hyaline, narrow, strongly keeled, dentate at apex.

Sometimes several spikelets are clustered together at the apex of the culm, with only one pair of empty glumes for all. A dwarf grass collected near San Quentin Bay, Lower California, by Mr. C. R. Orcutt, an ardent young naturalist of San Diego, Cal., for whom the genus is named.

Still Further Notes upon Corema Localities

BY JOHN H. REDFIELD.

1. CAPE COD. Thoreau, who visited Cape Cod in 1849 and 1855, noticed the occurrence of *Corema Conradii* at N. Truro and Provincetown,* and I have already mentioned that it had been seen at N. Truro by Benj. M. Watson, Jr., and by Mr. Robert Smith.† In July of this year I had opportunity of seeing one of the localities at this point. The light-house at N. Truro, known as the Highland Light, is situated upon a sandy bluff about 120 feet above the eastern or ocean shore of Cape Cod. About five or six hundred yards S W. of the light-house is a depression, extending eastward and westward between the sand hills. On the southern acclivity of this depression I saw the *Corema* extending over a space of about 100 feet in length and 75 in breadth, assuming a very prostrate position, probably owing to the strong winds to which these hills are exposed.

The soil is composed almost purely of large grains of quartz. The growth over this space is almost continuous, ending in isolated patches on the upper side, and beyond these were seen occasional very small single plants, in vigorous condition, as if seedlings from the older plants. The *Corema* was surrounded and occasionally penetrated by plants of *Hudsonia ericoides*. The nearest other plants were *Baptisia tinctoria*, and *Myrica cerifera*. The region is very similar in aspect to the more hilly portion of the Nantucket downs, and like those abounds with *Arctostaphylos Uva-ursi* and *Polygala polygama*. The locality seen by Mr. Smith, which is also in sight of the light-house, must be still another, judging from a photograph of it made by him. Thoreau saw it "near the edge of the banks, about half a mile southward" of the light-house. No doubt other localities exist, among the wide extent of the hilly downs of Cape Cod; but after seeing it, one is inclined to wonder that so little of it exists in a region where all the environment seems so favorable.

2. MT. DESERT I. On the ridge west of Long Pond, Seal Harbor, I found, last summer, two new localities. This ridge lies about a mile west of Barr Hill, on which occur the localities

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* Thoreau's Cape Cod, p. 154.

† Bulletin Torrey Botanical Club, xi., 99; xii., 93.

noted in the BULLETIN, xii., 94. The lithological characters of the rock are very similar, and the neighboring plants are the same. In the first of these localities, at a height of about 150 feet above the sea, on an area of open rock, of about 70 feet by 50, are a dozen or more patches of the plant. The second locality is about a fourth of a mile further N. W., at a height of perhaps 200 feet. Here is a large patch about 10 feet in length and 5 in breadth, and four or five smaller ones in close proximity. As might be expected in these rocky localities, there is never a large area of continuous growth, for it is only here and there that there is sufficient soil for foothold. During the last three summers a very large extent of the open rocky hills of the southern part of Mt. Desert has been carefully explored by myself and others, but the search has revealed only the five localities mentioned in this and a former paper.

3. DEER ISLAND. This is the largest island in Penobscot Bay, being about eight miles in length, with its greatest breadth about five miles. It nowhere reaches great elevation, and is separated from the more lofty Isle au Haut, to the south of it, by a channel of six miles in width, thickly strewn with islets. At the southern end of it is Green's Landing, where the steamer from Rockland to Bar Harbor makes regular stops. Mr. Chas. S. Wilder, of Florence, Mass., reports that "not far from Green's Landing, on the right of the road leading to North West Harbor, on a rocky eminence in a small pasture, the *Corema* is found in abundance. Many blueberry bushes are in the vicinity, and no pines." I am indebted to Mrs. Flora E. Haines, of Bangor, for this information.

4. MT. BEATTIE, CAMDEN, ME. From Mrs. Haines I also learn that Miss Fanny T. Hardy, of Brewer, Maine, found the *Corema* on the "east side of Mt. Beattie, on the right at the top of the trail, about a quarter of a mile from the edge." This confirms the information given by Prof. Chickering in Bulletin of Torrey Club, xi., 116.

Union of an Oak with a Birch.

Along the turnpike road on Staten Island, on the property known as the Cebra Homestead, there are two trees that have grown together in such a way that they would ordinarily be taken for one individual. One of these trees is a White Oak, the other being a Black Birch, and from seedlings on, their growth has been so even that neither one has gained any advantage over the other. For the space of 3 ft. 7 in. from the roots they have grown solidly together, so that the line of juncture is no more marked than the weather worn crevices down the sides of many large trees, the character of the bark serving as the best guide in distinguishing the trunk of one tree from that of the other. At the height mentioned from the ground the trunks part or branch, forming a Y, the oak being 4 ft. 2 in. in circumference, and the birch 4 ft. 5 in., while the main trunk, formed by both trees, measures 7 ft. 4 in. around.

It is no uncommon matter to find cedar branches, owing to their unpliability, enclosed by the trunks of other trees, and some species often become grafted together, but the case mentioned seems to be interesting as a departure from these general rules, and also from the symmetrical outline that has been maintained.

W. T. DAVIS.

Index to Recent American Botanical Literature.

Agarum Turneri.—On the Anatomy and Development of. James Elias Humphrey. (Proc. Amer. Acad. Arts and Sciences, xxii., pp. 195 204; two plates; also reprinted.)

This investigation is the seventh contribution from the cryptogamic laboratory of Harvard University, conducted under the direction of Dr. Farlow. Mr. Humphrey finds that the structure of the adult frond of this curious Alga agrees closely with that of *Laminaria*, that the frond increases in length at the union of stipe and lamina, and that the perforations of the latter begin when a length of 3 to 4 centimetres is attained, and are formed by the simultaneous formation of an indentation of one surface and the death of a corresponding portion of the other.

Azalea nudiflora.—(Vick's Ill. Month. Mag., ix., p. 294; colored figure.)

Bacteria apparatus—Home made.—T. J. Burrill. (Bot. Gazette, xi., p. 276, illustrated.)

Biology of Timber Trees with special reference to the requirements of Forestry.—B. E. Fernow. (Bot. Gazette, xi., p. 247.)

Botany at the American Association for the Advancement of Science.—(Am. Nat. xx., 886; Bot. Gazette, xi., pp. 221-229.)

Bracts in Cruciferæ.—Thomas Meehan. (Proc. Phil. Acad. Nat. Sci., 1886, p. 60.) *Alyssum* (*Koniga*) *maritimum* is cited as an exception to the general rule that the flowers of Cruciferæ are bractless.

Certain Chemical Constituents of Plants considered in relation to their Morphology and Evolution.—Helen C. De S. Abbott. (Bot. Gazette, xi., p. 270.)

This paper advocates the use of chemical analysis as a factor in classification, and adduces some interesting examples of similarity between the morphological and chemical characteristics of several groups of plants.

Desmodium molle, DC. John Donnell Smith. (Bot. Gazette, xi., p. 274.)

This name should be dropped from the catalogue, as the plant proves to be *D. tortuosum*, DC.

Dodecatheon—Essay toward a Revision of. Asa Gray. (Bot. Gazette, xi. p. 231.)

Forests of Canada. R. Bell. (Canad. Rec. Sci., ii)

Formation of Crow's Nest Branches in the Cherry Tree.—Thomas Meehan. (Proc. Phil. Acad. Nat. Sci., 1886, pp. 273, 274.)

The garden cherry has long been naturalized near Philadelphia, and Mr. Meehan had noticed this curious fasciation of the branches on three of these wild trees. He had made the interesting discovery that the fasciation is simply the growth to weak branches of what would normally be flower bearing shoots, the leaves being destroyed in spring by the fungus *Exoascus Wilsneri*, a European form closely allied to *E. deformans*, the species causing the "curl" in peach leaves.

Charles Christopher Frost. Wm. R. Dudley. (Journ. Mycol., ii., pp. 114-118.)

An interesting sketch of the life of one of the pioneers in American cryptogamic botany.

John Goldie, gardener and botanist. (Bot. Gazette, xi., p. 272.)

The discoverer of *Aspidium Goldieanum* died June last in Canada West.

Gymnosporangia of the United States.—The Development of the. W. G. Farlow. (Bot Gazette, xi., pp. 234-241; reprinted.)

Houstonia cœrulea. (Vick's Ill. Month. Mag., ix., p. 294; colored figures.)

Hypericum—Some Notes on. J. M. Coulter. (Bot. Gazette, xi., p. 275.)

H. Kalmianum has been found in Central Tennessee, and a new species named by Dr. Gattinger *H. lobocarpum* is also reported from W. Tennessee, which seems to be a center for this group, as eighteen species are found there.

Kellermannia. J. B. Ellis and B. M. Everhart (Journ. Mycol., ii., p. 111.)

The characters of the genus are amended, and two new species described.

Lichens collected in Florida in 1885. W. W. Calkins. (Journ. Mycol., ii., pp. 112-114; reprinted.

A catalogue of 73 species with habitats.

Liverworts. J. L. Zabriskie. (Journ. N. Y. Micros. Soc., ii. pp. 105, 106.)

The paper contains notes on *Marchantia polymorpha*, L., and *Fimbriaria tenella*, Nees.

Lygodium palmatum, and other N. A. Ferns. Garden, xxx., p. 324, illustrated.)

Mistletoe.—Additional Facts about the. G. Onderdonk. (Gard. Month., xxviii., p. 308.)

Morphology of superimposed Stamens. Thomas Meehan. (Proc. Phil. Acad. Nat. Sci., 1886, pp. 9-11; two figures.)

Mr. Meehan concludes, after a study of *Mahernia verticillata*, Cav., and other plants, that "in many cases superimposed stamens are the development of theoretical axial buds at the base of the petals" being thus of a cauline rather than of a phylline nature. He remarks that this theory relieves us of the difficulty met in the supposed interjection of an extra whorl of leaves in the production of these structures, for which there is no warrant in phyllotaxis.

Peronospora graminicola, Schr. Byron D. Halsted. (Bot. Gazette, xi., p. 272, illustrated.)

Platystemon Californicus. (Garden, xxx., p. 313, illustrated.)

Pollination of Asclepïas.—Notes on the Mode of. Charles Robertson. (Bot. Gazette, xi., p. 262, illustrated.)

Quercus alba.—The Structure of. P. H. Dudley. (Journ. N. Y. Micros. Soc., ii., pp. 107, 108.)

An interesting account of the formation and structure of the wood.

Ravenelia glandulæformis.—The Morphology of. G. H. Parker. (Proc. Amer. Acad. Arts and Sciences, xxii., pp. 205-219, two plates; reprinted.

Secretion of nectar in Libonia.—Production of nectar in Ornithogalum coarctatum. Thomas Meehan. (Proc. Phil. Acad. Nat. Sci., 1886, p. 59.)

Smilacina bifolia. "The One-blade." (Garden, xxx., p. 337.)

A very pretty illustration accompanied by a short description of its use as a rock-plant, and for carpeting shady places.

Sporobolus cryptandrus.—Expulsion of the Seeds of. W. J. Beal. (Bot. Gazette, xi., p. 247.)

Stamen of the Deerberry, Vaccinium stamineum. J. L. Zabriskie. (Journ. N. Y. Micros. Soc., ii., p. 109.)

Testa of the seeds of Phytolacca. Chas. W. Stockbarger. (Bot. Gazette, xi., p. 274, illustrated.

Timber.—The Uses of our Native. W. C. Butler. (Gard. Month., xxviii., pp. 306, 307.)

Triceratium.—Five Species of. E. A. Schultze. Journ. N. Y. Micros. Soc., ii., p. 110; two plates.)

These Diatoms were photographed from slides prepared by Professor Thum, of Leipzig, the material being obtained from Barbadoes. The excellent plates were made by the artotype process. Mr. Schultze was able to identify but one of the species; the others have been submitted to Prof. A. Schmidt.

Vancouveria hexandra. (Garden, xxx., p. 263, illustrated.)

Vegetable Parasites of Codfish. W. G. Farlow. (Bull. U. S. Fish Comm.)

Viola pedata. (Garden, xxx., p. 141, illustrated.)

Zephyranthes Atamasco. H. Nehrling. (Gard. Mon., xxviii., p. 309).

Note is made that in the Suwanee district of Florida this fine *Amaryllis* is known as the "Suwanee Lily," and that both white and rose colored forms occur there.

Botanical Notes.

Shortia galacifolia, Gray.—Prof. C. S. Sargent has found another station for this rare plant. He says, "I discovered last September in the Blue Ridge, near the boundary between North and South Carolina, *Shortia*, in what is believed to be Michaux's original locality."

Spiranthes Romanzoviana.—A. D. Webster (Garden, xxx., p. 253), tells us that "in all probability this plant has been exterminated in Ireland, for the two boggy fields in the County of Cork where it grew have been ploughed up and planted with potatoes; but F. W. Burbidge (Gard. Chron., xxvi., p. 471) thinks that at Bearhaven, Wales, where it has been collected, it has not yet "been evicted." It is figured in the Gard. Chronicle (xxvi., p. 400; xxi., p. 465.)

A Botanist's Ramble in Central America. By J. H. Hart. (Pamphlet, 8vo, 42 pp., Kingston, Jamaica, 1886.) This is an interesting account of a six weeks' trip to the mainland of Central America, made by the author in company with the Rev. Wm. Griffith, a missionary. The time was mostly spent near the great lagoon of Chiriqui, where many interesting plants were collected, among them a new tree fern, *Hemitelia Hartii*, Baker. Note is made of five varieties of the chocolate tree (*Theobroma Cacao*) cultivated, and a distinct wild species, *T. bicolor*, H. and B., known as Indian chocolate, was also met with. Palms and ferns were extremely abundant and in great variety. A list of the species collected is appended.

The Correspondence of Carl Von Linné. The Swedish Academy of Sciences has issued a work with this title, containing a record of all the correspondents of this famous naturalist, with their addresses, dates of birth and death, as well as the date of each letter. (Nature.)

Proceedings of the Club.

The first autumn meeting was held Oct. 12th, Dr. J. S. Newberry in the chair, and 31 persons present. The following were elected active members: J. W. Martens, Jr.; W. Beuttenmueller; Miss Winifred Edgerton, Ph. D.; Miss M. G. Tyler; Miss Mabel Hodges; Thos. E. Jevons, and Henry Ogden.

F. Le Roy Sargent, Volney M. Spaulding, W. M. Wilson, A. B. Seymour, Miss Emily L. Gregory, Ph. D., Geo. E. Davenport, Eugene A. Rau, David F. Day, M. S. Bebb, T. J. Burrill, B. E. Fernow, and F. V. Coville, were elected corresponding members.

From the report of the Field Committee the following localities for rarer plants are taken: Near Little Ferry, N. J., a *Habenaria*, intermediate in appearance between *H. ciliaris* and *H. blephariglottis*, having lemon-yellow flowers; at Metuchen, N. J., *Bidens chrysanthemoides*, with tubular ray-flowers. The excursion to Swimming River, N. J., in search of *Limnobium Spongia*, reported by Dr. Knieskern in his Catalogue of the Plants of Ocean and Monmouth Counties, published in 1857, failed of its object.

Mr. Southwick showed a branch of the Cedar of Lebanon from Central Park, bearing a fully developed cone. Prof. Schrenk remarked that he had collected the cones of this tree in Prince's Garden, Flushing, L. I. Dr. O. R. Willis exhibited specimens of *Erica cinerea*, *E. Tetralix* and *Calluna vulgaris* from Nantucket, and Prof. Day reported the last as naturalized in the Park at Halifax, N. S. Judge Addison Brown distributed specimens of *Onoclea Struthiopteris* from the vicinity of Litchfield, Conn. Dr. Britton remarked that the fern had now been collected at many points in the valley of the Delaware River, extending as far south as Trenton, N. J. Prof. Schrenk exhibited the European Dodder, *Cuscuta Epilinum*, growing on flax from Greenwich, N. Y. Mrs. Britton reported having collected *Equisetum arvense*, var. *serotinum*, at Mahwah, N. J., and *Habenaria Hookeri*, var. *oblongifolia*, Paine, at the base of Green Pond Mt., near Newfoundland, N. J., and exhibited specimens. She also showed Mr. C. G. Pringle's last collection of Mexican ferns, with a series of interesting photographs sent by Mr. Davenport, and stated that on consulting the Columbia College Herbarium, two specimens of the new *Notholæna Pringlei* had been found— one collected by Dr. Gregg, labelled, "Rock fern, Rocky hills, N. W. of Mapimi, April 17th, 1847," and another collected by Dr. Newberry at Sierra Rica, Chihuahua, December, 1882; both have been pronounced to be *N. Pringlei* by Mr. Davenport. Dr. Britton read a communication from Rev. E. E. Butler, and showed specimens of nuts and leaves sent by him from a tree growing near Morristown, N. J., which seems intermediate between *Juglans cinerea* and some species of *Carya;* the leaves are 3 or 5-foliate and pubescent; the nuts shorter than those of the Butternut, and otherwise different. Dr. Newberry read selections from the address of Wm. Carruthers before the Section of Biology of the British Association for the Advancement of Science, printed in Nature of Sept. 9th, 1886.

A Letter from Commissioner Colman to the Botanists of the A. A. A. S.

DEPARTMENT OF AGRICULTURE,
WASHINGTON, D. C., October 20th, 1886.

To the Members of the Botanical Club of the American Association for the Advancement of Science:

LADIES AND GENTLEMEN: I have noted with extreme gratification the interest you have taken in the work established by me in this Department, relative to the investigation of the fungus diseases of plants; and the resolutions you have passed commending my action and assuring me of your support and aid in securing the necessary means for the continued and successful prosecution of this most important undertaking are fully appreciated, and I wish to thank you on behalf of the farmers and fruit growers of the country, in whose interest and for whose direct benefit this work is designed.

As you are well aware, only a few of the more important plant diseases have been thoroughly worked out by scientists, and the little that has been done—little when compared with what there is to do, but a great deal when considered by itself—has been the result of private effort on the part of some of your own well-known members. Such obscure diseases as the peach yellows, the cotton rust, and the "foot rot" of the orange tree, demand immediate attention, and, for their proper elucidation, we need to command the services of our most skillful investigators, giving them opportunities to make special studies in the field until the knowledge desired is gained. As you have well suggested, a liberal supply of funds is required for this work.

In addition to the assistance in this particular, to which you have so generously pledged yourselves, I beg leave to call your attention to the fact that you, as botanists, knowing our cultivated and native plants and the fungus parasites infesting them, may do much valuable service as *observers* in your respective localities, by recording such facts as may come to your notice relating to this subject, and by collecting and transmitting to the Department material useful in the investigations, or that may serve to record the distribution of the injurious species of fungi.

Facilities for this work, and a free use of the mails, will be accorded those who may have such notes or materials to transmit, and the source of all matter that may be used for publication will be properly credited.

Again thanking you for your hearty commendation of my course in relation to the subject, and assuring you that I shall continue to do all in my power to further the work, I remain,

Yours respectfully,

NORMAN J. COLMAN,
Commissioner.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XIII.] New York, December, 1886. [No. 12.

New Species of Mexican Grasses.

Collected by Dr. Ed. Palmer, in S. W. Chihuahua, in 1885.

BY DR. GEO. VASEY.

ERIOCHLOA ARISTATA.—Culms 3 to 4 feet high, rather stout, decumbent and branching below, leafy, smooth below, scabrous-pubescent below the panicle; nodes finely pubescent or glabrous; sheath loose, smooth; ligule a ciliate ring; blade 5 to 8 inches long, ½ to ¾ inch wide, acuminate, smooth, scabrous on the margin; panicle 6 to 8 inches long, simple, rhachis and branches scabrous-pubescent; branches irregularly disposed, mostly alternate, somewhat clustered below, nearly sessile and flowering to the base, 1½ to 2 inches long, numerously flowered; spikelets one-flowered, empty glumes acuminate into an awn which is ⅓ to ½ their length, 4 to 6 lines long including the awn; flowering glume nearly 2 lines long, shortly mucronate, finely striate. With this are fine specimens of *Eriochloa Lemmoni*, V. and S., described in the Bot. Gazette for Dec., 1884.

SETARIA LATIGLUMIS.—Culms 10 to 18 inches high, simple or branching, slender, rather leafy, nodes finely pubescent; sheaths compressed, narrow, sparsely scabrous-pubescent, shorter than the internodes; ligule ciliate, blade narrow, 4 to 6 inches long, smoothish; spike 3 to 4 inches long, erect, loosely flowered; branches mostly few-flowered, sometimes the lower five to six and the upper one to two-flowered, mostly with one bristle to each flower; spikelets large, 2 lines long, 1 line wide; first empty glume ½ as long as the second, seven to nine-nerved, wider than long; second glume 2 lines long and as wide, about fifteen-nerved, cordate or auriculate at base, obtuse; third glume (that of the male flower) oblong-ovate, swollen at the base, 2 lines long, more than half as wide, about eleven to thirteen-nerved; flowering glume of the perfect flower ovate, 1½ lines long, mucronate-pointed. Bristles 8 to 10 lines long. Remarkable for the broad, many-nerved, inflated glumes.

SETARIA PAUCISETA.—Culms about 1 foot high, branched at the base, erect, rather rigid, compressed, leafy, the upper leaf enclosing the base of the panicle and equaling it; sheaths compressed and keeled, narrow, equaling or the upper longer than the internodes, ligule a ciliate ring, blade narrow, erect, 4 to 8 inches long, acuminate; panicle narrow, erect, loosely flowered, with short mostly simple branches; rhachis and branches angular, scabrous; bristles about twice as many as the fertile flowers; branches irregular, ¼ to ½ inch long, the upper single-flowered, the lower five to ten-flowered; spikelets about 1½ lines long, ovate,acute, one perfect and one neutral flower, first glume less than half as long as the second, becoming inflated, obtuse, thin, five to seven-nerved; second glume about 1½ lines long, broadly ovate or reniform, appearing acute from its volution, thirteen to fifteen-nerved; third glume ovate or oblong, seven to nine-nerved, with or without a palet; flowering glume ovate, slightly mucronate, about 1 line long. This and the preceding species are nearly allied, but well distinguished by the larger size and obtuseness of the spikelets, and the thicker and more inflated glumes of the former. The acute appearance of the spikelet in the present species depends on the folding of the outer glumes, as separately they are obtuse.

ÆGOPOGON GRACILIS.—Culms tufted, erect, slender, smooth, simple, 12 to 15 inches high; leaves mostly near the base, 1 to 2 inches long, very narrow, the upper cauline ones half an inch or less, ligule short, membranaceous, with the margins prolonged, the upper sheaths very long, (2-2½ inches); panicle racemose, 1 to 1½ inches long, composed of ten to twelve sessile, divergent clusters of spikelets, mostly one-sided by the twisting of the short alternate pedicels. the clusters consisting of one sessile and two short pedicelled spikelets; spikelets 2 to 3 lines long; empty glumes acutely three-lobed, the middle lobe extended into an awn; flowering glumes oblong, three-nerved, three awned, the lateral awns twice shorter; palet oblong, shortly two toothed or awned at the apex.

MUHLENBERGIA RAMOSISSIMA.—Culms numerous from one root, rather slender, 2 to 3 feet long, much branched, the branches long; leaves 2 to 3 inches long, narrowly linear, acuminate, smooth; ligule membranaceous, short, lacerated; sheaths striate, smooth, shorter than the internodes; panicle narrow, nodding, 4 to 6 inches long, lax, the base included in the upper sheath; branches unequal, erect, capillary, 1 to 3 inches long, flowering mostly to the base, numerously flowered; spikelets 1 to 1½ lines long without the awn; empty glumes minute, ¼ to ⅕ as long as the flowering glume, obtuse, the upper one the larger; flowering glume 1 line long, acuminate, sparsely hairy below, three-nerved, the lateral nerves extended into short teeth, the midnerve into a fine capillary awn 9 to 10 lines long.

MUHLENBERGIA SPECIOSA.—Culms stout, erect, 3 to 4 feet high, almost wholly covered by the long sheaths, nodes few and near the base; radical leaves numerous, very long and narrow, rigid, those of the culms similar; sheaths softly pubescent, the upper ones very long and overlapping; ligule woolly, keel and margin of the leaves scabrous; panicle ample, 1 to 1½ feet long, 3 to 4 inches wide, lax, branches irregularly semi-verticillate and very numerous, slender, 2 to 4 inches long, subdivided nearly to the base, pedicels mostly longer than the spikelets: spikelets about 1 line long; empty glumes slightly longer than the flower, covered with long, white hairs, thin, equal, nerveless; flowering glume ovate, three-nerved, hairy on the nerves, tipped with a fine awn 5 to 9 lines long; palet oblong, sparsely hairy, nearly equaling its glume. All the glumes and the palet are of about the same texture. A very showy grass.

MUHLENBERGIA PALMERI.—Culms erect from a strong, creeping rootstock, stout, 3 to 4 feet high, leafy; leaves 1 to 2 feet long, narrow, coarse, becoming involute, with long, setaceous points, ligule short, rigid; panicle long and narrow, 8 to 12 inches long, ½ to 1 inch wide, erect, branches numerous, mostly flowering to the base, ½ to 1 inch long; spikelets 2 lines long; empty glumes nearly equal, ⅓ shorter than the outer ones, mucronate, one-nerved; flowering glume oblong-lanceolate, three-nerved, scabrous on the keel, bidentate at the apex, and with an awn 2 to 3 lines long; palet as long as its glume, narrow, acute.

MUHLENBERGIA ARGENTEA.—-Culms numerous from one root, 12 to 18 inches high, simple, rather slender, leafy; leaves about 6 inches long, very narrow, ligule membranaceous, long and pointed; panicle nodding, lax, open, 4 to 6 inches long, the base enclosed by the upper sheath, branches capillary, mostly in twos, flowering from the middle or below, mostly simple; spikelets thin and with a silvery lustre, about 1½ lines long, on short pedicels; empty glumes ⅔ to ¾ as long as the flower, flat or very little compressed, nearly equal, acute, the upper one three-toothed at apex; flowering glume oblanceolate, membranaceous, three-nerved, slightly pubescent on the nerves, two-lobed at the apex, the awn between proceeding from the upper fourth, twice as long as its glume; palet as long as, or longer than its glume, linear-oblong.

All the glumes and the palet are flattened or very little compressed.

Euphrasia Officinalis, L.

The only New England locality cited for this species in Gray's Manual, is "Alpine summits of the White Mountains, N. H." It is also there reported as found at Lake Superior and northward. It is now known, however, to occur occasionally on the southern portion of Mount Desert Island, where I have seen it in grassy places near roadsides. I have also seen it in grassy swards on the southern portion of Great Cranberry Island, and also on Great Duck Island, both lying south of Mount Desert Island. Pringle also noted it, in 1879, on the south shore of the St. Lawrence River, one hundred miles below Quebec, in the fields near the shore.* In all these places it would seem to be an introduced plant.

J. H. R.

[We can testify to finding *E. officinalis* on Duck Island in 1880, and can also add that we have found it growing abundantly along grassy roadsides at Grand Lake, Nova Scotia, and remember seeing it on the slopes of the fortifications at Quebec. In Nova Scotia, along roadsides, was also found the Ladies' Mantle, *Alchemilla vulgaris*, L., which is undoubtedly of European origin.—ED.]

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*Bulletin of the Torrey Botanical Club, vi., 366.

The Pores of the Libriform Tissue.*

BY EMILY L. GREGORY, Ph. D.

The results of the investigations in this direction served, in most instances, to confirm this supposition. Some care was taken to discriminate between small tracheæ and tracheids by use of macerated preparations. These attempts were not wholly satisfactory, owing to the impossibility of examining every separate cell. They served, however, to prove that in some instances the cells referred to by anatomists as tracheids, are really small tracheæ. For example, in *Robinia*, a large number of tracheid-like cells were found to communicate directly with each other by means of a circular opening in the partition wall. These two classes, small tracheæ and tracheids, seem to pass into each other here, by gradual transition stages, some being found to possess an opening at one end, thus communicating directly with the next cell, while at the other end no trace of an opening could be found.

Enough examples were studied to show that great variety exists in the number of elements of different woods. In *Quercus*, as before described, all the elements occur, so also in *Ligustrum*. Others were found to lack one or more, as *Ribes*, which lacks the thin-walled tracheids; *Comarum*, the simple-pored libriform; *Berberis*, the bordered-pored libriform, and also the wood parenchyma. Quite a large number have only large and small tracheæ; such are *Populus*, *Salix*, *Acer*, *Fraxinus* and others. Here occurs the difficulty before mentioned, of deciding accurately between tracheids and small tracheæ. In many woods where openings were found between the cells it was only by the most careful manipulation, and it is impossible to say with certainty that they fail entirely in any of the above mentioned cases. On the other hand, when they are found to exist in any part of the specimen under consideration, we can only infer that they exist throughout in the same element.

Only two examples were found which contained only large tracheæ and simple-pored libriform. These are *Betula alba* and *Corylus Avellana*. Here the tracheæ appear to be of a nearly uniform size, no small ones being present. In these two instances it must be inferred that either the simple-pored libriform cells do contribute in no small degree to the passage of water, or that the local needs are satisfied by some arrangement of the numerous large tracheæ. Although we have, at the beginning, excluded the consideration of the cells of the medullary rays and wood parenchyma, as not materially affecting the question of the nature of the libriform tissue, the suggestion may be allowed here, that a factor of such importance in the water transport, as this probably is, may come in play in a somewhat different manner here than in cases where the number of elements is greater.

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*Continued from page 204.

The simplest woody tissue was found in *Veronica Andersoni;* a woody stem of two years' growth was found to contain only large and small tracheæ and simple-pored libriform, and no medullary rays nor wood parenchyma. In one year growths of *Chelone* and *Digitalis* the same structure was found, but the woody growth was not so well developed. The small tracheæ here might easily be mistaken for tracheids, and it is not possible to say with absolute certainty that all of these are really tracheæ. The greater number examined were found to communicate directly, therefore the others, having the same appearance in other respects, are supposed to agree also in this one.

In the literature on this subject, examples are given of one year's stems of certain Cruciferæ which contain no medullary rays, but these cases of *Veronica*, *Chelone* and *Digitalis* appear to be the first ones found where wood parenchyma also fails. It is the more remarkable as in other genera of the same family well developed and complex forms occur.

It is conceded at the outset that there is ground in the foregoing pages for the following objection, namely: That the hypothesis of a functional difference between bordered and simple pores is here based mainly upon another supposition, that of the water transport through the cell-lumen, which is itself only a supposition, and has yet to be substantiated by proof.

This objection, however, cannot be urged against the consideration of the question simply from the anatomical-systematical standpoint. It must be conceded, that without regarding this supposed function of the pores, a certain interest attaches itself to the question how far this anatomical difference, that is, the presence or absence of the *border* in the libriform tissue, coincides with the morphological characteristics which decide the limits of genera, families and groups in our present system of classification.

Specimens from nearly all the genera of the large and most important dicotyledonous families were studied and compared in reference to this question. Some few of these families contain only two or three genera with woody tissue; of others only a few species were available, but the greater number of the families given in the following list were exhaustively examined.

With this examination we begin by comparing the genera of the different families, as there is no question in regard to the similarity of anatomical structure, in this respect, between the different species of the same genus.

Genera from sixty-one principal and six sub-families were examined with the results shown in the following tables; the sub-families are given here separately owing partly to the large number of genera some contain, and partly on account of certain differences in structure which incline botanists to regard them as distinct families.

Families whose Libriform Contains only Simple Pores.

Anacardiaceæ.
Araliaceæ.
Acanthaceæ.
Anonaceæ.
Acerineæ.
Ampelideæ.
Borragineæ.
Bignoniaceæ.
Betulaceæ.
Berberideæ.
Compositæ.
Corylaceæ.
Euphorbiaceæ.
Ebenaceæ.
Juglandaceæ.
Labiatæ.
Lobeliaceæ.
Lauraceæ.
Moreæ.
Myrsineæ.
Meliaceæ.
Papilionaceæ.
Polemoniaceæ.
Plumbagineæ.
Primulaceæ.
Rutaceæ.
Rhamneæ.
Salicineæ.
Selagineæ.
Ulmaceæ.
Umbelliferæ.
Verbenaceæ.
Valerianaceæ.

Families whose Libriform Contains only Bordered Pores.

Apocynaceæ.
Asclepiadeæ.
Cornaceæ.
Dipsaceæ.
Epacrideæ.
Ericaceæ.
Empetraceæ.
Gordeniaceæ.
Magnoliaceæ.
Proteaceæ.
Platanеæ.
Rhodoraceæ.
Staphylaceæ.
Vaccinieæ.
Styraceæ.

Sub-Families.

Dryadeæ.
Pomeæ.
Roseæ.

Families whose Libriform Contains Both Kinds of Pores.

Campanulaceæ.
Celastraceæ.
Fagaceæ.
Sapotaceæ.
Myrtaceæ.

Sub-Families.

Amygdaleæ.
Spireæ.
Buxaceæ.

Families whose Genera do not Agree in Reference to the Pores.

Caprifoliaceæ.
Oleaceæ.
Ranunculaceæ.
Saxifragaceæ.

Scrophulariaceæ.
Solanaceæ.
Tiliaceæ.
Zygophylleæ.

By comparing these results in reference to the families of different groups, it will be seen that the idea of relationship between these families is not sustained by a correspondence in the anatomical structure of the libriform tissue.

In the group Labiatifloræ, for example, we find the families Labiatæ, Bignoniaceæ, Acanthaceæ and Verbenaceæ all contain libriform, with only simple pores; Globulariaceæ, which according to some authors belongs in this group, has at least one example, namely, *Globularia* with only bordered pores, while Scrophulariaceæ contains genera which do not agree in this respect, that is, some genera contain both bordered and simple pores, others only simple pores. The remaining two families usually included in this group, viz.: Plantagineæ and Lentibulariaceæ, were not examined, as they contain but few plants with well-developed woody tissue.

Of the families of another large group, Rosifloræ, we find Pomeæ, Roseæ and Dryadeæ agree in possessing pores with borders, while Spiræa and Amygdaleæ have both kinds. Of this group Poterieæ, Quillajeæ and Chrysobalaneæ were not examined.

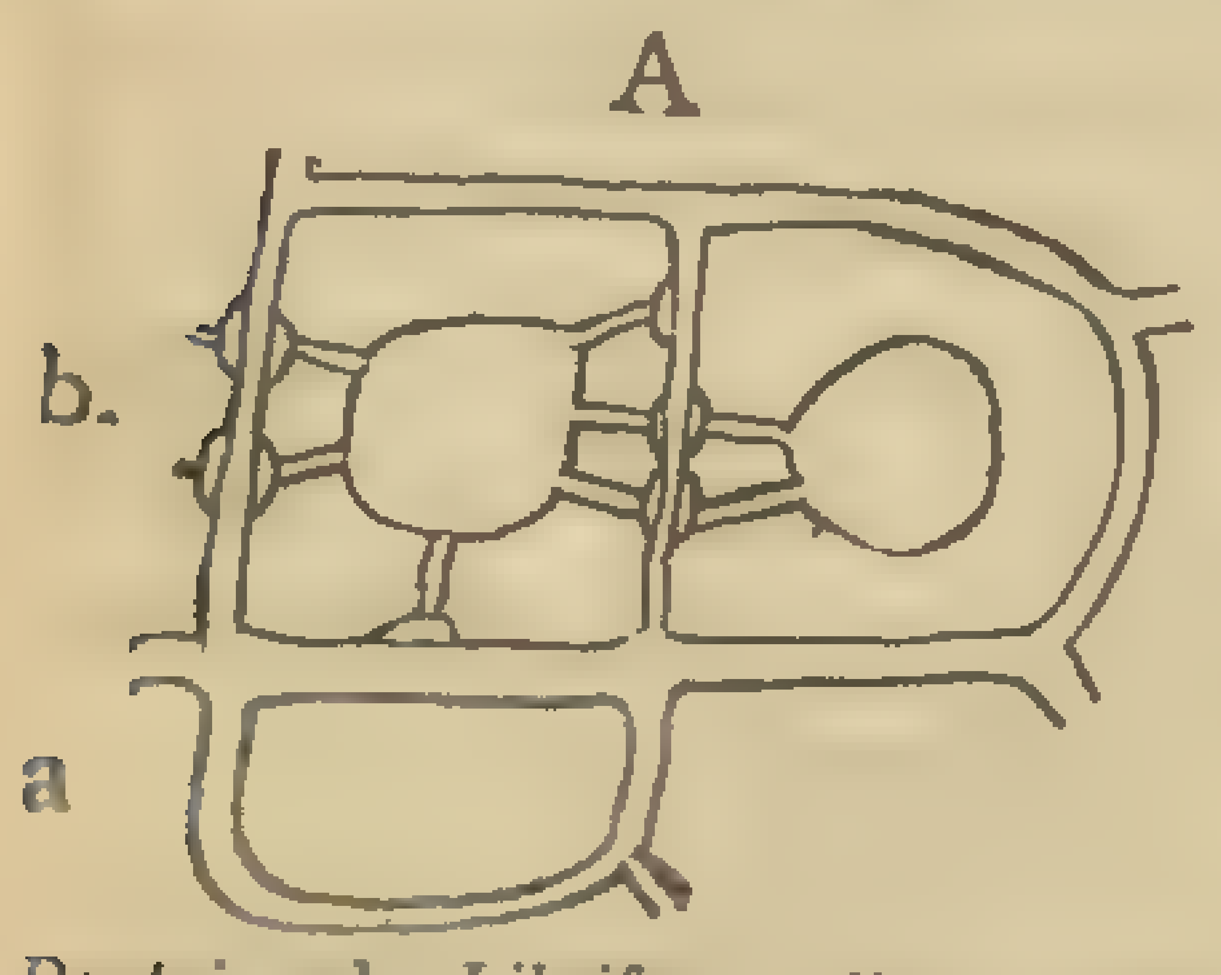
In a number of other groups we find the same difference existing between the families composing them, and sometimes even between those families in which a certain degree of relationship is a well established fact; for example, Compositæ and Dipsaceæ, the former having simple, the latter bordered pores. So also with Anonaceæ and Magnoliaceæ.

On the other hand, there are two small groups whose members agree; these are Primulineæ, containing the families Primulaceæ, Myrsineæ and Plumbagineæ, all of which have only simple pores. The second group is Bicornes, containing Epacrideæ, Ericaceæ, Vaccineæ, Rhodoraceæ and Hypopityaceæ, which contain only bordered pores. The latter family is not given in the list, because the only representatives of this family which were examined are placed by Bentham and Hooker in the family Ericaceæ.

These examples are perhaps sufficient to verify the statement made in reference to the classification of families. In regard to the agreement of genera, the tables show without further explanation that the genera of thirty-three families agree in having only simple pores; of eighteen in having only bordered; of eight in having both kinds, while out of the whole number, sixty-seven, only eight are found where genera do not agree. A further description of these eight families will show that in most instances the morphological-systematic characteristics fail to indicate a very close relationship.

In the family Oleaceæ, three genera by some authors considered as sub-families, viz.: *Syringa*, *Ligustrum* and *Fraxinus*, vary from each other not only in regard to the presence or absence of the border, but also in other respects. In *Syringa* the libriform tissue contains pores with unusually large well-developed borders. *Fraxinus* has libriform with only simple pores, while *Ligustrum* has both kinds. The two latter genera differ widely in regard to the other elements of the woody tissue. That is, *Ligustrum* represents the most complex type, *Fraxinus* the most simple. Specimens of both were treated with Schultze's macerating solution, and in *Fraxinus* only tracheæ and simple-pored libriform were found. (Wood parenchyma and medullary ray cells are also present, as in all examples given where no special reference is made to them.) In *Ligustrum*, on the other hand, are found all the varieties of wood elements. As no systematist claims for these two genera a very close degree of relationship, this difference in anatomical structure is not so striking. *Forsythia* has large and well-developed borders in the pores of the libriform tissue.

A parallel case is found in the family Saxifragaceæ, so far as the libriform is concerned. *Philadelphus* has only bordered-pored libriform, *Ribes* has both kinds. These two genera, however, present such morphological differences as to be classed by some authors in separate families. *Hydrangea* and *Deutzia* have bordered pores. In *Deutzia* the borders are not as large as in other genera, but the pores are very numerous, several lying on the same wall of a cross-section, as seen in fig. A.



Deutzia.—b—Libriform cells. a—Cells of the medullary ray.

Of Zygophylleæ only a few specimens could be obtained. Of those examined, *Tribulus* has only simple, *Guaicum* only bordered, and *Zygophyllum*, both kinds of pores.

In Ranunculaceæ, *Clematis* has only simple pores (these, however, are very numerous), while *Adonis* and *Pæonia* have bordered pores.

In Tiliaceæ, the genus *Corchorus* has libriform pores possessing borders of medium size. The other genera examined contain only simple-pored libriform. In Caprifoliaceæ, *Viburnum* has only bordered, *Sambucus* only simple pores.

This leaves only two more families belonging to this category, viz: Solanaceæ and Scrophulariaceæ. All the genera examined of the family Solanaceæ, except *Brunfelsia* and *Franciscea*, agree in having simple-pored libriform. These two genera have both kinds of pores in this tissue, the bordered element predominating over the simple. Endlicher classes these two genera with Scrophulariaceæ. With the members of this family they agree not much better, though one genus of Scrophulariaceæ examined contains both kinds of pores. Also the different genera of Scrophulariaceæ vary from each other in the number of elements of the woody tissue much more than those of Solanaceæ. This is so striking as to deserve particular mention.

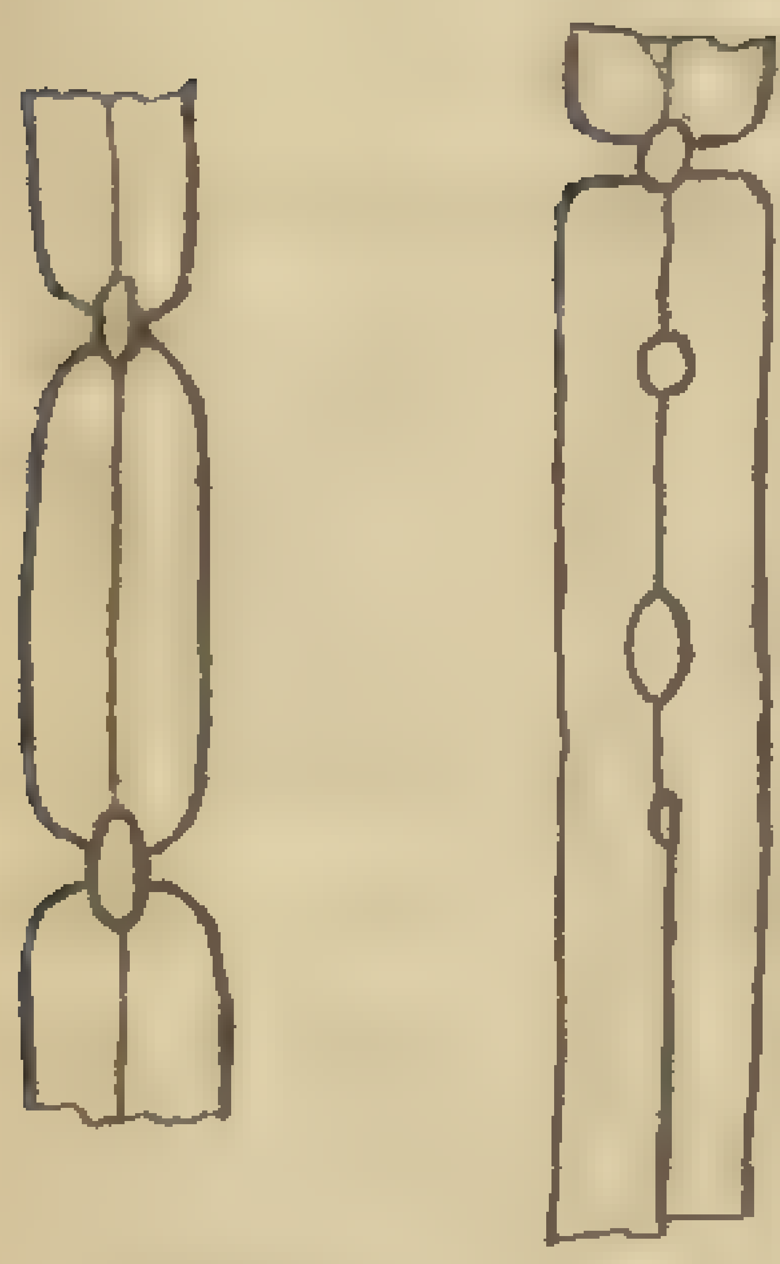
As before stated, all the genera of the family Scrophulariaceæ, examined except *Freylinia*, contain libriform with only simple pores. In *Veronica*, *Chelone* and *Digitalis*, tracheæ and libriform cells form the entire woody tissue. We have previously mentioned *Veronica* as being the only example where both medullary rays and wood parenchyma cells fail. This is not strictly true, for *Chelone* and *Digitalis* both have the same structure, viz: only tracheæ and libriform, but in these cases the stems examined were of only one year's growth and the woody portion not well developed; the specimen of *Veronica Andersoni* on the contrary, was a fair example of woody development. In *Halleria*, *Celsia*, *Scrophularia* and *Scoparia*, in addition to these elements, medullary-ray cells occur, but no wood parenchyma. In *Paulownia* and *Diplacus* the wood parenchyma is added; in *Paulownia* this surrounds the large tracheæ, no small ones occur. In *Diplacus* the larger tracheæ lie in radial rows along the medullary rays, thus in both instances the tracheæ are in connection with living, acting cells. In *Freylinia* the libriform contains both bordered and simple pores, the former predominating; all the other elements belonging to the most complex type are also found here, unless it may be the thin-walled tracheids, as it is not possible always to decide between these and the small tracheæ. So here we have a most marked contrast to the simple structure of the woody tissue of *Veronica*.

This variation of structure in the genera of a few families presents a striking contrast to the uniformity prevailing in the great majority. While it suggests at once the idea that the degree of relationship between the members of those few families may be very remote, still in those instances where this idea is not substantiated by corresponding morphological differences, as in case of the last family described, the possibility of transition stages in the development of the border naturally suggests itself.

Assuming only what is self-evident in reference to the function of the pores, that is, that they are designed to allow a freer communication between the cells than the walls otherwise furnish, we may suppose that in case of increased demand in this respect there might gradually occur a corresponding change in the form, size, or frequency of the pores to meet this demand.

First, as regards the form, it is possible that in this way the simple pore with its funnel-shaped enlargement at the base may, by a succession of changes, have developed into the bordered pore, the curve of the enlargement having grown more and more defined until at last it has changed into a decided angle. The attempt to verify this supposition by observation is, of

B



course, entirely impracticable. There is possibly a suggestion of such transition in the genus *Liriodendron*, B, before referred to, where the *borders* in the same cell were found to vary a little in form, some having the typical lenticular form, others inclining more to a circular shape. This, however, can be considered only as a suggestion.

It is, however, quite diffierent when the question of size alone is considered. Several families were found in whose different genera all variations in the size of the border occur. For example, the family Ericaceæ, of which the genus *Erica* offers, perhaps, the best example found of this supposed beginning stage of the border. Here the form corresponds exactly with those found in the other genera, and we can trace the increase in size from one genus to another till we reach the genera *Vaccinium* and *Oxycoccus*, where the border attains a medium size.

In other families there was found great variation in the number as well as size of the pores. In the genus *Drimys* of the family Magnoliaceæ, the number of pores is about as great as the surface of the cell wall will allow, and the border quite as large as in some of the conifers. In *Illicium* the pores are considerably less frequent and the border nearly one-half smaller. In *Liriodendron* and *Magnolia* the pores are so few in number and the border so small that they may easily be mistaken for simple pores. The difference in regard to the number of elements was also quite suggestive in these genera. In *Drimys*, where the borders are so large and so numerous, very few tracheæ occur, and none whose diameter exceeds that of the libriform cells. *Illicium* and *Liriodendron* contain a large number of tracheæ of different diameters and a smaller amount of wood parenchyma. These variations appear very striking when compared with the uniformity found in other families.

In conclusion, one more family may be referred to, whose genera contain both simple and bordered elements in the libriform tisssue in such variable quantities as to render it an exception to most other families: this is Myrtaceæ. As before stated, *Myrtus* forms an exception to all the other genera by the absence of, at least, any visible simple-pored libriform. In *Eucalyptus globulus* a few cells only were found to contain simple pores. In *Eucalyptus perfoliatus* the number of cells containing simple pores is much greater; in a number of other genera, *Leptospermum*, *Melaleuca*, *Metrosideros*, *Eugenia*, etc.,the quantity of each element is about the same.

From this somewhat cursory survey of the various families and groups, the conclusion reached is, that there is a certain parallelism between this peculiar anatomical structure and the morphological-systematical characteristics which decide the limits of the family, the principal cases which furnish exceptions to this statement being themselves genera of doubtful character.

Outside the limits of the family, however, this parallelism does not exist. That is to say, while the families of two or three groups were found to correspond in this respect, the greater number of groups showed no such correspondence in the structure of the libriform tissue.

A few words of explanation are necessary in regard to the terminology used in speaking of the various elements of the woody tissue. No particular system has been followed, not from any lack of systems, but rather from the opposite reason. Nearly every writer on this subject suggests a special method of classification. Of all the different articles on woody tissue that of Sanio is perhaps the most thorough and exhaustive. His method of classification is extremely difficult to use, as will be seen by the following explanation. He divides the wood elements, whose long axes are parallel with the long axis of the stem, into three classes: parenchymatic, tracheal and libriform elements. He distinguishes the tracheids from the bordered-pored libriform cells by the difference in the size of the border, and further, he says the real libriform cells never have spiral thickenings, which are almost always present in the tracheids. As they are not always present, and as he gives no concrete example which may be taken as a measure for the size of the border when we wish to decide whether a cell is to be classed with the tracheal or libriform element, we have no means to determine definitely.

A more recent article has appeared, " Vergleichende anatomische Untersuchungen über die Differenzen im Primärem Bau der Stengel und Rhizome Krautartiger Phanerogamen" by Wladyslaw Rothart, in which the author suggests a principle of classification which he says rests on a morphological-anatomical basis, and claims for this method a great superiority over that based on the physiological-anatomical characteristics. He states expressly that in this system the mischievous practice of considering the probable function of an element in deciding to which class of tissue it belongs has been carefully avoided.

According to this author the wood elements are first divided into two classes, Desmogen and Bythom, or "strang" and "grund" tissue. The former he divides into four classes, the latter is not divided. Only the first two divisions of the Desmogen are of interest in this connection, namely: Inom and Tracheom. As Inom are considered all those desmogenic elements containing simple pores or none. As Tracheom all those containing bordered pores; this class includes the ring and spiral, as well as the "netz-gefässe," (reticulated tracheæ) the ring and spiral wall-thickenings being considered only modifications of the bordered pore, and the reticulated tracheæ a transition form between these two. This division is based principally on the common sculpture of the cell wall, which he says may be considered an infallible criterion.

It is well known that in many instances a single member of a trachea which borders on other tracheæ as well as on cells of the medullary ray and libriform tissue contains large and numerous bordered pores on the side adjacent to the other tracheæ, while that part of its wall bordering on the cells of the medullary ray or libriform tissue contains simple pores, and these in comparatively small numbers. In these cases the infallibility of the wall-sculpture does not appear sufficient to decide the class to which the element belongs. Very often in the course of this work were found single tracheal tubes; that is, a tube consisting of many members was found isolated from other tracheæ, and as far as could be traced it contained only simple pores. It is not improbable that where such tubes joined other tracheæ otherwise than by a dissolved partition wall, the usual bordered pores occurred, but as far as the section extended these members were entirely isolated from other tracheæ and contained, as before mentioned, only simple pores. Here it is equally difficult to decide to which class this belongs. According to the wall sculpture, it must be ranked with the thick-walled, closed, libriform cells, a classification which to us appears quite as unnatural as any of those based upon the probable function of an element.

Therefore, as no better method suggested itself, the generally conceded functions of the woody tissue were taken as a basis for division, viz: to furnish a means for the transport of water and to give strength and solidity to the stem. According to this idea, the different elements treated have naturally grouped themselves into two classes: those whose walls are so thin as to preclude the idea that they are of use as strengthening-cells, and those which, according to their anatomical structure and all the facts gained by experiment, may serve in both capacities, but more especially as strengthening-cells.

By speaking of this as a method of division, it is not meant that it furnishes an exact criterion, but only that it avoids the necessity of one. Where the various facts concerning an element lead to the conclusion that its principal function is that of a water carrier, this element is referred to as tracheal; where the facts point to the opposite conclusion the element is considered libriform. According to this view the bordered pore is considered a peculiar organ of the water-transporting elements, and whenever it is found in the thick-walled cells its presence is supposed to indicate that these cells undertake both functions of the woody tissue.

Since the completion of the foregoing pages, an article, "Ueber den Systematischen Werth der Holzstructur bei den Dicotyledon," has appeared, by Dr. Hans Solereder, Munich, in which this difference in the libriform tissue has been studied in a much larger number of families than the time and material for the present work has allowed. As the author only includes this among all the various other anatomical characteristics of the dicotyledonous woods, with no reference to any possible physiological meaning, he has, naturally, taken a different standard for the bordered pore, namely: the size of the border, and says wherever the border is larger than the "*spalt*" the pore may be considered bordered. As this definition is sometimes difficult of application, he overcomes this by placing some families with small and imperfectly developed borders in the list with those containing only simple pores.

In this way it happens that the tables given by this author do not always agree with those of the present paper. For example, *Betula* and *Alnus* he gives among the bordered pored, although explaining that the border is here generally smaller than the "spalt." Also the pores of the libriform of *Fraxinus* he says possess " deutliche" borders, although smaller than the "spalt." Several other instances occur where the different standards taken to decide what a border is, cause a difference in the classification.

This indicates, however, no real difference in opinion, as the definition is simply arbitrary in both cases, and in instances like *Betula* and *Alnus*, the test of the angle between the tube and the border-opening was extremely difficult of application. Certain species of *Alnus* were examined where, had the decision rested on single cases alone, these must have been included in bordered-pored libriform.

It is hardly necessary to add in conclusion that the probability of the hypothesis assumed in the foregoing pages would be greatly strengthened by experiments proving that water, when forced by artificial means though a piece of wood consisting of bordered-pored libriform, passed through more readily than through wood containing only simple-pored libriform. Several experiments of this kind were tried at different times in the laboratory of Prof. Schwendener of Berlin, and also in that of Prof. Cramer at Zürich, the results of which were partially successful. It is hoped that these results may be verified and the experiments extended so far as to render them of sufficient interest for future publication.

Time of Fruiting of Buxbaumia aphylla.

In December of 1884 I noticed two patches of this interesting moss growing near Hamden Swamp, in the vicinity of New Haven, Conn.

My attention was first attracted by the bleached empty capsules of the preceding year's growth. One patch was situated near a decayed stump, the other at the foot of an oak. The soil was comparatively dry, the spots where the moss grew being elevated several feet above the level of the adjoining swamp.

When first observed, the growing capsules were green, small, and quite soft to the touch. I visited the locality at intervals of about two weeks, but found little change in the condition of the capsules until the beginning of spring, when they became swollen and began to assume a pretty purplish hue.

On the 19th of April they appeared to be perfectly developed. W. E. SAFFORD.

Examination of Pine-Seed Wings.

In connection with the recent discussion as to the identity or non-identity of *Pinus edulis* and *P. monophylla*, I would suggest a microscopic examination of the cellular structure of the wings of the seed as a valuable means of specific differentiation. These cells, no less by their general shape than by their contour, are so characteristic, that by them alone the species to which a given specimen belongs can be determined with tolerable certainty. Such at least is the result of my observation with a limited number of species. Further investigation is necessary to decide as to its general applicability.

The examination is quite easy, as the wings are translucent, and a low power, from 80 to 100 diameters, suffices.

G. N. BEST.

Insular Floras.

BY JOHN H. REDFIELD.

The outer islands lying off the coast of Maine have a flora of a triple character. The wooded portions have the trees of the mainland, mostly spruces, firs and birches, and under their shelter grow the characteristic smaller plants of the northern flora, and where the ground is swampy, a great variety of species find a home. But the cleared portions, which have been cultivated or used for sheep pastures, are often extensive, and these harbor a great number of species which may be called "tramps"—sometimes as unwelcome as human tramps—while, lastly, the rocky coasts and stony beaches give a legitimate place to many strictly maritime species. Some of these islands have an extensive area, and furnish a flora too large to enumerate here. In the BULLETIN of October last, I mentioned the plants seen on a short visit to one of the smaller isles, and now I will speak of one still smaller. Between Little Cranberry Island and Baker's Island, is a ledge of rocks about a mile in length, bare only at very low tides. About midway of it is a low, treeless islet, which is above the level of high tide. It is protected by a bank of shingle thrown up by the waves, while its interior is covered with verdure. The area is hardly more than an acre. It is seldom visited, but I had an opportunity on September 2d of spending a few minutes upon it, and noted the following plants:

Cakile Americana, Nutt.; *Geranium Robertianum*, L.; *Lathyrus maritimus*, L.; *Potentilla Anserina*, L.; *Rubus strigosus*, L.; *Ribes hirtellum*, Mx.; *Œnothera biennis*, L.; *Archangelica Gmelini*, L.; *Ligusticum Scoticum*, L., in great abundance; *Aster* (?) *tardiflorus*, L.; *Solidago sempervirens*, L.; *Ambrosia artemisiæfolia*, L.; *Achillea Millefolium*, L.; *Cnicus arvensis*, Hoffm.; *Mertensia maritima*, Don., in great profusion; *Convolvulus sepium*, L.; *Scutellaria galericulata*, L.; *Plantago decipiens*, Barn.; *Chenopodium album*, L.; *Suæda linearis*, Torr., var. *ramosa*, Wats. (*S. maritima* of Gray's Manual); *Triglochin maritimum*, L.; *Iris versicolor*, L.; *Ammophila arenaria*, Host.

Erica and Calluna on Nantucket.

On a visit to Nantucket some years ago, Mrs. Catherine Starbuck, the President of the Botanical Society there, showed me a locality where I saw the *Erica cinerea* growing. The spot was situated miles from any dwelling. Mrs. Charlotte C. Pearson, an active member of the Society, informed me that she had found it when a child, in a locality far from dwellings, and where trees had never been known to grow.

In September of this year Mrs. Pearson sent me a specimen of *E. cinerea* from a new locality, and stated that the plant had been found in four different places on the island, far apart. Early in October she sent me specimens of *Erica Tetralix* and *Calluna vulgaris*, informing me that they were found in a tract planted with Larches imported from England. I wrote asking her to procure all the information possible as to the locality, when she wrote that Mr. Henry Coffin, a gentleman of means, with a desire to afforest parts of the island, imported from England 9,000 seedling Larches, and from Illinois 30,000 Scotch Firs, and planted them upon twenty acres of land. After I wrote for information, Mr. Coffin visited the planted tract and made a thorough search; in that exploration he discovered twenty patches in which the *Erica* was growing; it was about evenly distributed over the whole tract, and was as abundant among the Firs brought from Illinois as among the Larches from England.

The seed of the *Erica* is so well protected that it will endure much exposure; this fact favors a theory that the plant has been introduced by man's agency, and that it has either been brought by settlers as an ornamental plant, and escaped from cultivation, or has been sown by seeds brought on in seed-grain, or among the roots of trees.

But in opposition to this theory, it has never been found in the vicinity of dwellings, nor near cultivated grounds.

O. R. WILLIS.

Unusual Leaf-Forms in Platanus occidentalis.

I send some leaf specimens taken from a Plane tree near Houston. Compared with the usual form of the leaf, most of the leaves on this particular tree are but slightly toothed. while a large proportion are only pointed at the three lobes—the rest of the margin entire. Has this peculiar sport of the Plane been noticed before? It is another instance of the diversity in the form and outline of leaves belonging to a single species.

As this Plane (*P. occidentalis*) is easily propagated by cuttings (more readily than its oriental kin) there is reason to believe that a fixed variety can be secured.

G. C. NEALLEY.

Index to Recent American Botanical Literature.

Agaricus campestris. Worthington G. Smith. (Gard. Chron., xxvi., pp. 492, 493; two figures.)

A popular account of the field mushroom, with excellent illustrations of its structure and appearance.

Beginnings of Natural History in America. G. Brown Goode. (Proc. Biol. Soc. Washington, iii., pp. 35-105; reprinted.)

This paper is the presidential address delivered at the sixth annual meeting of the Biological Society of Washington. Dr. Goode traces the early history of zoological and botanical science in America. The earliest English naturalist on our shores was Thomas Harriott, who was the mathematical instructor of Sir Walter Raleigh, and who was landed on Roanoke Island, Aug. 17, 1585. He was preceded, however, by the Spaniard, Gonzalo Fernandez de Oviedo y Valdes, who visited Santo Domingo in 1514, and was subsequently governor of that island, and also by Jean de Lery, a member of the Huguenot colony established in 1555 on an island in the bay of Rio de Janeiro, and by José d'Acosta, a missionary, who travelled in Peru from 1571-1588. It is a valuable contribution to the history of American science.

Brodiæa Douglasii. J. G. Baker. (Bot. Mag., plate 6,907.)

A beautiful illustration of one of the finest species of the genus, drawn from a plant which flowered at Kew in May from a bulb sent by Mr. Pringle.

Caltha palustris, L.—Versuch einer Gliederung des Formenkreises der. Günther Beck. (Verhandl. K. K. zool. bot. Gesellsch. Wien, xxxvi., pp. 347-353.)

Being occupied with a review of the forms of *Caltha* hitherto found in Austria, Dr. Beck has extended his studies of this plant, in order to bring together all the described forms. Four European and Asiatic species and their varieties are first considered, and seven varieties of the Linnæan *C. palustris* are then noted; these he divides into two sections, (a) sepals large, 1 to 2 cm. long, and (b) sepals small, narrow, about 1 cm. long. In the first section he places var. *typica*, var. *integerrima* (*C. integerrima*, Pursh) and var. *parnassifolia* (*C. parnassifolia*, Raf.), all of which are credited to North America; in section (b) we find var. *minor*, (*C. minor*, Miller) and var. *asarifolia* (*C. asarifolia*, DC.) credited to North America, and two other Asiatic and European varieties. *C. flabellifolia*, Pursh, *C. arctica*, R. Br., and *C. biflora*, DC., are excluded by Dr. Beck.

Darlingtonia Californica. (West American Scientist, ii., pp. 91, 92; one figure.)

The habitat of this interesting plant is "in mountain swamps and along the borders of brooks, at an elevation of from 1,000 to 6,000 feet, from Truckee Pass to the borders of Oregon."

Fertilization of Cassia Marilandica. Thomas Meehan. (Proc. Phil. Acad. Nat. Sci., 1886, pp. 314-318.)

An interesting study, in which reference is made to Mr. Leggett's notes in early numbers of the BULLETIN. Mr. Meehan observed that as soon as the flowers open they are freely visited by bumble bees, which alight on the anthers of the long lower stamens, using these as a platform, and then open the pores at the apices of the anthers of the four shorter stamens, and empty them of pollen. He thinks that these pores are covered by membranes and are never ruptured except by insect agency. A gauze bag was placed over a panicle of the flowers, completely protecting them from the bees, and not one of the blossoms so enclosed produced a pod. Mr. Meehan was unable to ascertain that the anthers of this species ultimately split longitudinally, as Dr. Torrey believed happened with those of *C. nictitans.*

Florida Fungi.—Notes on. W. W. Calkins. (Journ. Mycol., ii., pp. 126-128.)

This is Mr. Calkins' ninth contribution, and brings the number of species noted up to 136.

Fungi.—New. J. B. Ellis and Geo. Martin. (Journ. Mycol., ii., pp. 128-130.)

Eleven new species are characterized.

Grasses of the Arid Districts of Kansas, Nebraska and Colorado —An Investigation of the. Dr. George Vasey. (Dept. Agric., Botanical Division, Bulletin No. 1, p. 18, 13 plates; Washington, 1886.)

The most important pasture grasses of the region are the "Gramma Grass" (*Bouteloua oligostachya*) and the "Buffalo Grass" (*Buchloe dactyloides*); Dr. Vasey estimates that they together form 75-90 per cent. of the whole grass product; numerous other species are found, however, and among these *Andropogon provincialis*, *A. scoparius*, *Panicum virgatum*, *Distichlis maritima*, *Chrysopogon nutans*, *Kœleria cristata*, *Muhlenbergia glomerata*, *Hilaria Jamesii*, *Sporobolus cryptandrus*, *S. airoides* and *Elymus Canadensis* are noted and illustrated.

Hickory Nuts of North America. Joseph F. James. (Pop. Sci. Month., xxx., pp. 70-78; illustrated.)

An attempt to trace the genealogy of all our species of *Carya.*

Lastarriæa, Remy.—*Confirmation of the Genus with Character extended.* C. C. Parry. (Proc. Davenp. Acad. Nat. Sci., v., pp. 35, 36; reprinted.)

Chorizanthe Lastarriæa, Parry, is *L. Chilensis*, Remy, and two new species from Chili are described.

Lilium tigridum.—Notes on. Thos. Meehan. (Proc. Phil. Acad. Nat. Sci., 1886, pp. 297, 298.)

Orthotrichia,—A new Genus of Myxomycetes. Harold Wingate. (Journ. Mycol., ii., pp. 125, 126; one figure of *O. microcephala*, Wingate.)

Paspali of Le Conte's Monograph.—Notes on. Dr. George Vasey. (Proc. Phil. Acad. Nat. Sci., 1886, pp. 284-290.)

This monograph was published in 1820 in Vol. 91 of the Journal de Physique. Dr. Vasey has critically examined all of Major Le Conte's specimens contained in the Herbarium of the Philadelphia Academy, and gives us the results of his studies in this valuable paper. His final revision of the genus may be found in the September number of this BULLETIN.

Pear Blight.—History and Biology of. J. C. Arthur. (Proc. Phil. Acad. Nat. Sci., 1886, pp. 322-336+; one plate.)

This paper is a resume of the investigations conducted by Dr. Arthur and others on the disease caused by the *Micrococcus amylovorus*, Burrill.

Pollen in the Flowers of Indigofera.—On Projection of. Thomas Meehan. (Proc. Phil. Acad. Nat. Sci., 1886, pp. 292-294.)

Polyembryony.—D. P. Penhallow. (Can. Rec. Sci., ii., p. 177.)

Mr. Penhallow records the frequency of this phenomenon in the seeds of the Tangierine orange. Among 38 seeds, only six produced single plants, while 19 produced two plants, nine three plants, and from four seeds four seedlings each originated.

Pyrola rotundifolia. (Garden, xxx., p. 429; illustrated.)

Quercus dentata.—Note on. Thomas Meehan. (Proc. Phil. Acad. Nat. Sci., 1886, pp 280, 281; three figures.)

Mr. Meehan exhibited to the Philadelphia Academy specimens of this Japanese oak, with pistillate flowers, which, like those of our annual-fruited species, are borne at the ends of the new growth, in pairs, on short peduncles. The tree was raised from an acorn, and is now about ten years old. In DeCandolle's Prodromus it is stated that its fruit was unknown at the time that volume was issued.

Rhus Toxicodendron. (Gard. Chron., xxvi., p. 502 and p. 598.)

Our poison ivy is grown in English nurseries under the name *Ampelopsis Japonica*, and its dangerous character seems to be doubted by contributors to the Gardener's Chronicle, though the editors try to impress on them the chance of serious consequences if the leaves or shoots are handled. The glorious autumn coloration of its foliage is much admired in England, where the native shrubs are in general far inferior in this respect to our own.

Sarracenias.—(Garden, xxx., pp. 366, 367; plate 566.)

Descriptions of the species, and of their numerous artificial hybrids, 15 of which are noted. The plate illustrates *S. Moorei* (*S. flava* × *S. Drummondi*) and *S. Popei* (*S. flava* × *S. rubra.*)

Thalictrum.—North American Species of. William Trelease. (Proc. Bost. Soc. Nat. Hist., xxiii., pp. 293-304; one plate and two cuts. Also reprinted.)

In this revision of our Meadow Rues, which may be regarded as preliminary to Dr. Gray's treatment of the genus in the Synoptical Flora, twelve species are recognized, as against fourteen enumerated by Dr. Watson in his Bibliographical Index, *T. anemonoides* being referred to *Anemonella*, Spach, and *T. Wrightii*, Gray, to a variety of *T. Fendleri*, Engelm. The *T. Cornuti* of Gray's Manual is referred to *T. polygamum*, Muhl., and Prof. Trelease finds that it is never glandular, so that all glandular plants of the polygamo-diœcious section appear to be referable to *T. purpurascens*, L,; the var. *ceriferum*, Austin, is only an extreme state of the species. In the vicinity of New York we have found that *T. purpurascens* generally blooms much earlier than *T. polygamum*, so that when the former has mature fruit, the latter is in its most conspicuous state in the swamps and meadows. *T. Kemense*, Fries, of Alaska, is reduced to *T. minus*, L., var. *Kemense*, and *T. Fendleri*, Engelm., var. *polycarpum*, Torr., is *T. polycarpum*, Watson. Prof. Trelease prefaces the systematic portion of his paper with a discussion of the structural features of the genus, and of the adaptation of the various species to insect or wind pollination.

Thistles. Grant Allen. (Pop. Sci. Month., xxx., pp. 101-108.)

Botanical Notes.

Absorption of Water by the Leaf-hairs of Reaumurea and Tamarix. In the Egyptian desert the leaves of these plants produce a number of little basin-like depressions in which the glandular hairs secrete a bitter crystalline salt which exudes over the surface of the leaf, and by absorbing the dew at night, become saturated with moisture.—(Gard. Chron., xxvi., p. 594.)

Heteromorphous Leaves in Nymphæa rubra. M. J. Costantin has recorded in the Bulletin de la Société Botanique de France the occurrence of two different kinds of leaves on this Water Lily. One is entirely submerged, thin, transparent, and possesses no stomata; the other is the normal kind of floating leaves, with stomata on the upper surface. He notes a similar occurrence in *Nuphar lutea.* This feature is well known in our *N. Kalmianum*, and has been observed in *Limnanthemum* (see this BULLETIN, x., p. 34). We do not recollect any statement as to the presence or absence of stomata on the submerged leaves of *Potamogeton.*

Index Floræ Sinensis. An enumeration of all the plants known from China proper, Formosa, Hamian, Corea, the Luchu Archipelago and the island of Hong Kong, together with their distribution and synonymy. F. B. Forbes and W. B. Hemsley. (Journ. Linn. Soc., xxiii., pp. 1–80, plates I. and II.) This part includes twenty-three orders, and is the first of a series.

Proceedings of the Club.

The regular monthly meeting of the Club was held November 9th, at Columbia College, the President in the Chair and 57 persons present.

Mr. John I. Northrop was elected an active member, and Messrs. Marshal H. Bright, James Goldie and Robert Gausby corresponding members.

Dr. Britton distributed specimens of *Alyssum calycinum*, L., from Tuckahoe, Westchester Co., N. Y., where it grows abundantly on the outcropping surfaces of the crystalline limestones; the plant is new to the Westchester County Flora.

Dr. Newberry read the announced paper of the evening on "The Food and Fibre Plants used by the North American Indians," which will subsequently appear in the BULLETIN.

BULLETIN

OF THE

TORREY BOTANICAL CLUB.

VOL. XIV.

FOUNDED BY WILLIAM H. LEGGETT, 1870.

NEW YORK.
1887.

GENERAL INDEX.

(Illustrated articles are designated by an asterisk* before the page number.)

- Abutilon striatum, note on, 96.
- Adiantum pedatum, dehiscence of the sporangium of, *180.
- Alchemilla vulgaris 10, 12, 43.
- Anacardiaceæ, a supposed new genus from Bolivia, 143.
- Anemone acutiloba, Lawson, Diœcism in, *119.
- Annotations, 228.
- Aralia nudicaulis, L., a new variety of, 166.
- Asplenium rhizophyllum, Kunze, var. Biscaynianum, new var., *97.
- Assimilatory system, on the, 53.
- Asteromphalus Roperianus, Grev., note on a variety of, *96.
- Bibliographical Notes on well known plants, 136, 165, 177, 215, 225, 257.
- Botanical Literature, index to recent American, 15, 35, 59, 77, 100, 126, 149, 167, 191, 219, 239, 259.
- Botanical Notes, 22, 41, 63, 83, 106, 130, 174, 197, 222, 247, 263.
- Calluna vulgaris, 11.
- Camellia Japonica, note on the inflorescence of, 32.
- Caulophyllum thalictroides, some morphological notes on, 189.
- Caulophyllum thalictroides, note on the color of, 258.
- Cerastium arvense, L., and its North American varieties, *45.
- Characeæ, some notes on, *211.
- Cliftonia nitida, Gærtn., 167.
- CONTRIBUTORS:
  - Allen, T. F., *211.
  - Ami, Henry M., 14.
  - Bailey, W. W., 96.
  - Bessey, Charles E., 189, 202.
  - Best, G. N., 258.
  - Bisky, Julius A., 13.
  - Britton, E. G., 10, 96, 202.
  - Britton, N. L., 19, *45, 84, 114, 143, 149, 168, 187, 224.
  - Burgess, T. J. W., 43.
  - Canby, Wm. M., 67.
  - Claypole, K. B., 258.
  - Cook, O. F., 89.
  - Eaton, Daniel C., 97.
  - Foerste, Aug. F., *74, 139.
  - Gray, Asa, 228.
  - Greene, Edward L., 116, 136, 165, 177, 215, 225, 257.
  - Halsted, Byron D., *121.
  - Holden, Isaac, 97, 149.
  - Hollick, Arthur, *45.
  - Horner, C. N. S., 218.
  - James, Joseph F., 223.
  - Kain, C. Henry, 25, 57, 78, 131, 141, 172, 174, 247.
  - Lawson, George, 12.
  - Lyon, Florence May, *180.
  - Meehan, Thomas, 58, 59, 218, 238.
  - Miller, E. S., 131.
  - Millspaugh, C. F., 183.
  - Morong, Thomas, 51.
  - Newberry, J. S., *1.
  - Northrop, J. I., 230.
  - Oyster, J. H., 223.
  - Peirce, Mary F., 229.
- CONTRIBUORS—Continued:
  - Porter, Thos. C., 8.
  - Rusby, H. H., 42, 83, 125.
  - Safford, W. E., 144, 159.
  - Sargent, F. Le Roy, 63.
  - Schrenk, Joseph, 14, 53, 77.
  - Schultze, E. A., *69, *96, *109.
  - Seymour, A. B., 193.
  - Smith, Chas. E., 34.
  - Sterns, E. E., 32, 122.
  - Stowell, Willard A., 76.
  - Taylor, Geo. H., 141.
  - Tillinghast, Frank N., 59.
  - Underwood, L. M., 89,
  - Urban, Ignatius, 106.
  - Vasey, George, 8, 94, 98, 103, *133, 203.
  - Vroom, James, 12.
  - Watson, Sereno, 155, 167.
  - Willey, Henry, 134, 247.
  - Wright, S. Hart, 135.
- Corema Conradii, 11.
- Cyperaceæ, a new genus in, 135.
- Diatomaceæ, new fossil deposits of, 57.
- Diatomaceæ of Shark River, N. J., 29.
- Diatoms, notes on, 25, 57, 78, 131, 141, 171, 172, 174, 247.
- Diatoms, a descriptive list of Staten Island, *69, *109.
- Drying plants with little loss of color, a method of, *33.
- Echinocystis, 155,
- Echinopepon, 155.
- Erica cinerea, 11.
- Eryngium Ludovicianum, n. sp., 51.
- Erythroxylon Coca, the lateral lines in the leaf of, 125.
- Euphrasia officinalis, 10, 12, 58.
- Fern, another Florida, 149.
- Ferns, notes on some Florida, 97.
- Flora of Banda Oriental, 144, 159.
- Flora of Cayuta Creek, notes on the, 183.
- Flora of the Kittatinry Mountains, note on the, 187.
- Floras, a meeting-place for two, 189.
- Grasses, new, 94.
- Grasses, new species of Mexican, 8.
- Grasses, special uses and properties of some Mexican, 98.
- Introduced plants, in Eastern Massachusetts, 219.
- Lichen, note on a new North American, 134.
- Lignin, a new reagent for, 14.
- Linnæa borealis, L., 136.
- Liquidambar, elongation of the inflorescence in, 95.
- Liriodendron simplex, n. sp., (fossil) *6.
- Liriodendron oblongifolium, n. sp., (fossil) *5.
- Liriodendron quercifolium, n. sp. (fossil), *6.
- Marsilia, notes on the American species of, 89.
- Marsilia vestita, var. tenuifolia, n. var., 92.
- Megarrhiza, 155.
- Mollugo verticillata, L., note on, 218.
- Myosurus minimus, Linn., 165.
- Nitella Morongii, n. sp., *214.
- Nitella Muthnatæ, n. sp., *211.
- Nomenclature, a point in, 167.
- Notes from Queens County, Long Island, 13.
- Nuphar, 177.
- Nymphæa, 177.

Panicum Havardii, n. sp., 95.
Plants, American, some new or little known, 51.
Plants, Long Island, 59.
Plant Notes from Termiscouata County, Canada, 230.
Plants, two new Florida, 8.
Platanus occidentalis, forms of, 58,
Poa rupestris, n. sp., 94.
Populus heterophylla, L., note on the flowers of, 114.
Proceedings of the Botanical Club of the A. A. A. S., 202.
Proceedings of the Club, 24, 43, 67, 87, 107, 131, 153, 175, 199, 250, 265.
Ranunculi, some Californian, 116.
Rosa, remarks on the group Carolinæ of, 253.
Rosa humilis, var. lucida, n. var., 256.
Rosa humilis, var. villosa, n. var., 256.
Redfieldia, a new genus of grasses. *133.
Redfieldia flexuosa, n. sp,. *133.
Sanguinaria Canadensis, notes on, *74.
Sarracenia variolaris, note on, 229.
Saxifraga Virginiensis, some anomalous forms of, 122.
Saxifraga Virginiensis, var. pentadecandra, n. var., 124.
Sherardia arvensis, in Canada, 14.
Sherardia arvensis, L., 238.
Sporobolus annuus, n. sp., 9,
Sporobolus racemosus, n. sp., 9.
Sporobolus Shepherdi, n. sp., 8.
Starch in tracheal ducts, 77.
Sycocarpus, gen. nov., 143.
Sycocarpus Rusbyi, n. sp., 143.
Tolypella Macounii, n. sp., *212.
Tulip tree, the ancestors of, *1.
Violets, notes on New Jersey, 76.
Websteria, gen. nov., 135.
Websteria limnophila, sp. nov., 135.

ERRATA, VOLUME XIV.

Page 98, line 27, for immediate, read intermediate.
" 118, " 4, " alternately, " all ternately.
" 209, " 15, " Sisyribrium, " Sisymbrium.
" 209, " 34, signature, E. G. Britton, Secretary, omitted.
" 210, " 19, for Echinpos, read Echinops.

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Cretaceous Liriodendra.

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Cretaceous Liriodendra.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XIV.] New York, January, 1887. [No. 1.

The Ancestors of the Tulip-Tree.

BY J. S. NEWBERRY.

Plates LXI and LXII.

The genus *Liriodendron*, as all botanists know, is represented in the present flora by a single species, "the Tulip-tree," which is confined to Eastern America, but grows over all the area lying between the Lakes and the Gulf, the Mississippi and the Atlantic. It is a magnificent tree, on the whole the finest in our forests. Its cylindrical trunk, sometimes ten feet in diameter, carries it beyond all its associates in size, while the beauty of its glossy lyre-shaped leaves and tulip-like flowers are only surpassed by the flowers and foliage of its first cousin, *Magnolia grandiflora.* That a plant so splendid should stand quite alone in the vegetation of the present day excited the wonder of the earlier botanists, but the Sassafras, the Sweet-gum and the great Sequoias of the far West afford similar examples of isolation, and the latter are still more striking illustrations of solitary grandeur.

Before the study of fossil plants threw its light upon the history of our living flora such cases admitted of no satisfactory explanation, but we now know that all the trees enumerated above with our Magnolias, Button-ball and deciduous Cypress, are relics of the golden age of North America vegetation; of a time when a genial climate prevailed all the way to the Arctic Sea, and when a well-watered and fertile soil supported forests in which our now lonely giants lived surrounded by brothers, cousins and more distant relatives as gigantic as themselves, and all combined to form the grandest forest-growth the world has ever seen. But the glorious summer which continued perhaps a million of years, and created or fostered all the noblest forms of forest life that have come down to us, and many perhaps nobler, that have perished, was followed by a winter of corresponding severity and duration—the Ice Period—in which snows and glaciers spread from Greenland and Alaska southward until two-thirds of the continent was under snow and ice. All the region north of New York and Cincinnati was then changed from a paradise to a howling wilderness, where not a trace remained of the luxuriant vegetation that before covered the surface, or of the varied fauna that was associated with it, except where leaves, trunks and bones, relics of earlier generations, were buried in rock or soil too deep to be reached by the grinding glacier or the burrowing torrent. These relics we have disinterred on Greenland, Disco Island, on the McKenzie and in Alaska, as well as at many places further south, in the country bordering the Columbia, the Missouri, in New Jersey and Virginia. Seven quarto volumes filled with descriptions and plates of fossil plants constitute the contribution that Prof. Oswald Heer has made in his "Flora Arctica" to our knowledge of the vegetation that covered the circum-polar lands before the Ice Age, and an equal mass of material has been gathered by Lesquereux, Ward, Fontaine and the writer, as a preparation for the work of illustrating the wonderfully rich Cretaceous and Tertiary flora of North America. Although but a beginning has yet been made, already the remains of at least a thousand distinct species of arborescent plants have been brought to light. The botanical relations of many, perhaps most of these, are yet to be accurately determined, but the general character of the vegetation which covered our continent in the later geological ages has certainly been ascertained, and much light has been thrown on the derivation and history of our present flora.

With the facts before us, we are fully warranted in making the statements, that our angiosperm flora began its existence on this continent in middle Cretaceous times, that even then its present aspects were distinctly developed, and subsequent changes have been rather of degree than of kind. In the banishment of our Tertiary flora from the great area it once occupied, and its restriction to the narrow space at the South into which it was forced, many of its finest elements were destroyed ; and when, with an amelioration of climate, the exiles returned to that portion of their former home again opened to them, they came as a handful representing a host, perhaps as solitary species, remnants of generic groups that mostly perished by the way.

Among these survivors the Sequoias stand first in magnitude and interest, and their story has been admirably told by Dr. Gray in his "Sequoia and its History." The Liriodendron, the Magnolias, the Liquidambar, the Cypress, the Sassafras and Platanus, will also, I hope, have their biographers, and to aid in the task of one of these I now give some of the facts which have come to my knowledge in regard to the history of our lyre-leaved Tulip-tree.

Three species of *Liriodendron* are indicated by leaves found in the Amboy clays—Middle Cretaceous—of New Jersey, and others have been obtained from the Dakota group in the West, and from the Upper Cretaceous strata of Greenland. Though differing considerably among themselves in size and form, all these have the deep sinus of the upper extremity, so characteristic of the genus, and the nervation is also essentially the same. Hence, we must conclude that the genus *Liriodendron* now represented by a single species was in the Cretaceous age much more largely developed, having many species, and those scattered throughout many lands. In the Tertiary age the genus continued to exist, but the species seem to have been reduced to one, which is hardly to be distinguished from that now living. In many parts of Europe leaves of the Tulip-tree have been found, and it extended as far south as Italy. Its presence there was first made known by Unger in his Synopsis, p. 232, and in his *Genera et Species*, p, 443, where he describes it under the name of *Liriodendron Procaccinii*. Later it was mentioned by Massalongo (Flora Senogalliensis, p. 311) and Heer (Urwelt der Schweiz, p. 331) and it is enumerated and figured among the fossil plants of Iceland by Heer in his Flora Arctica, Vol. I., p. 151, taf. XXVI., fig. 7 b; taf. XXVII., fig. 5–8; from the Tertiary of Greenland, Vol. VII., p. 121, taf. LXXXIII. Leaves of similar form are described and figured in Heer's Flora Tertiaria Helvetiæ, Vol. III., p. 29, tab. CVIII., fig. 6, with the name of *Liriodendron Helveticum*, Fisch.; also Ettinghausen in his Flora v. Bilin, p. 9, tab. XLI., fig. 10, describes a fragment which he names *L. Haueri*. All these are, however, so much like the living species that it is impossible to distinguish them, and they should probably be united with it. We here have a striking illustration of the wide distribution of a species which has retained its characters both of fruit and leaf quite unchanged through long migrations and an enormous lapse of time.

In Europe the Tulip-tree, like many of its American associates, seems to have been destroyed by the cold of the Ice Period, the Mediterranean cutting off its retreat, but in America it migrated southward over the southern extension of the continent and returned northward again with the amelioration of the climate.

Of the species of *Liriodendron* found in the Dakota group of Kansas, the leaves of one (*L. Primævum*, Newb., Later Extinct Flora of North America, p. 12), are much like those of the living species, but are considerably smaller. Another species (*L. Meekii*, Heer), has small fiddle shaped leaves (Plate LXI., fig. 3–4). Prof. Heer considers this identical with *L. primævum*, but the form is quite different and no connecting links have been found. From the Amboy clays we have obtained one leaf which apparently represents *L. Meekii*; it is typically fiddle-shaped, though larger then the Dakota leaves.

Prof. Heer also unites with *L. Meekii* some ovate emarginate leaves from the Dakota and Greenland strata, to which he formerly gave the names *Phyllites obcordatus* and *Leguminosites Marcouanus*, but it is by no means certain that they were borne by the same tree that carried the leaves called *Liriodendron Meekii*. Indeed the probabilities are against it since no intermediate forms have been found, and none of the panduriform leaves of *L. Meekii* have been obtained from Greenland, where obovate, entire or emarginate leaves similar to those given the above names do occur, and also many of the emarginate, oblong-ovoid or lanceolate leaves, which I have called *Liriodendron simplex*.

Several additional species of *Liriodendron* are enumerated by Mr. Lesquereux among the fossil plants of the Dakota group, viz.: *L. giganteum*, Lesqx.; *L. intermedium*, Lesqx., (Cret. Flora, p. 93, Pl. XX., fig. 5; Pl. XXII., fig. 2); *L. acuminatum*, Lesqx.; *L. cruciforme*, Lesqx.; *L. semi-alatum*, Lesqx.; *L. pin-*

natifidum, Lesqx. (Bull. Mus. Comp. Zoöl., Vol. VII., No. 6, p. 227.) As only the first two are figured, and that from fragments, and the others very briefly described, I am unable to make any satisfactory use of this important material in tracing the life-history of the genus.

It is a remarkable fact that among all the great collections of Laramie and Eocene plants made on the Upper Missouri, in Oregon, Washington, Wyoming and Colorado, and studied by Lesquereux, Ward and the writer, not a single leaf of *Liriodendron* has yet been identified.

I append figures and descriptions of three new species of Tulip-tree recently obtained from the Amboy clays of Woodbridge, New Jersey.

LIRIODENDRON OBLONGIFOLIUM, n. sp.

PL. LXI., FIG. 1.

Leaves 6 to 8 inches in length, by 4 to 5 inches in breadth, oblong in outline, long-petioled ; base rounded, square or slightly cordate ; summit deeply emarginate, sides bearing three or more obtuse or acute points, separated by shallow sinuses ; nervation distinct, moderately strong, midrib straight, terminating in the bottom of the sinus of the upper extremity, lateral nerves nearly straight, parallel, forming two series, the stronger ones separated by intervals from a quarter to half an inch broad, branching and inosculating at their extremities, and forming a series of loops near the margin ; between these are shorter and more delicate nerve-branches, which are usually simple and equally divide the interspaces.

Unfortunately but few of these leaves have been found, and none of them are quite perfect. Together they are, however, sufficient to determine the general form and nervation. Their resemblance to the leaves of the living species, *L. tulipifera*, is striking, but the form is more oblong. In the living species the lobes of the margin are quite variable; generally the basal pair are much developed, and above these a deep sinus on each side leads up to the terminal points. Not unfrequently, however, we find two, and sometimes three, points on a side, and a much nearer approach to the form of the leaves before us. The leaves of the living species are, however, always shorter, and relatively broader, yet the resemblance on the whole is so close that it is impossible to avoid the conclusion that we have in these Cretaceous leaves relics of the progenitor of the living species with all the more important characters of form and nervation already distinctly specialized.

LIRIODENDRON QUERCIFOLIUM, n. sp.

PL LXII., FIG. 1.

Leaves large, 6 inches long by 4 broad, long petioled, base horizontal or slightly cordate, summit deeply emarginate, sides bearing each three or four pointed, sometimes spatulate lobes, separated by narrow sinuses which reach nearly to the midrib; nervation regular, midrib straight or curved, terminating at the bottom of the sinus of the summit, strong side branches traversing each lobe and terminating in the point, between these more delicate, generally simple, branchlets.

The general form of these leaves is considerably like that of some of the oaks, *Quercus alba*, *Q. nigra*, etc.; a character which has suggested the name. The strong terminal emargination, and the nervation suffice, however, at once to separate them from *Quercus*, and bring them into *Liriodendron*. As will be seen by the figures now given there is considerable diversity in these leaves, some having broader lobes and shallower sinuses, approaching the form of those of *L. oblongifolium*, with which they are associated in the Amboy clays. As a whole they show a variation from the leaves of the living species in an opposite direction from those of *L. oblongifolium*, the latter being more simple in outline, oblong in form, with small points or lobes on the sides, whereas these are much more deeply lobed.

LIRIODENDRON SIMPLEX, n. sp.

PL. LXII., FIGS. 2, 3, 4.

Leaves 3 to 4 inches in length, long-petioled, ovate-lanceolate in outline, from 1 inch to 2 inches in width at the broadest part; summit emarginate, wedge-shaped; nervation fine, but distinct, midrib strong, terminating abruptly in the sinus of the summit; lateral branches forming two sets, the first and larger being separated by intervals of about one quarter of an inch, branching near their extremities, and anastomosing to form a coarse net-work along the border; the spaces between these divided unequally by one or several smaller, shorter, and generally simple nerve-branches which run parallel with the large ones, sometimes connecting with the exterior net-work; all the spaces between the lateral nerves occupied by a relatively coarse reticulation.

Although so different from the leaves described under the names of *L. oblongifolium* and *L. quercifolium*, these have in common with them the peculiar angular emargination so characteristic of the genus, and essentially the same nervation. The more elongate and lanceolate form represented on Plate LXII., figures 3, 4, occurs in considerable numbers, and may perhaps represent a distinct species, but others are broader and more ovate, like those represented in Plate LXII., figure 2.

Taken by themselves, these two forms would be regarded as specifically different, but there are connecting links between them, and we must regard the several shapes as showing simply the variation of foliage so common in other trees. Prof. Heer in his Flora Arctica, Vol. VI., Plate XXII., has represented a number of leaves which apparently belong to the same species with those now under consideration. All these he regards as varieties of *L. Meekii*, first described by him from the Dakota sandstones, but it seems to me that they do not represent either of the two forms from the Dakota group, *neither of which have yet been found in Greenland.* Hence, until more material shall show the simple, ovate or lanceolate forms to be connected by insensible gradations with others, I must regard them as specifically distinct.

EXPLANATION OF FIGURES.

Plate LXI., Fig. 1.—*Liriodendron oblongifolium*, N., Amboy Clays, New Jersey.

Fig. 2.—*Liriodendron primævum*, N., Dakota Group, Nebraska.

Figs. 3. 4.—*Liriodendron Meekii*, Heer, Dakota Group, Nebraska.

Plate LXII., Fig. 1.—*Liriodendron quercifolium*, N., Amboy Clays, New Jersey.

Figs. 2, 3, 4.—*Liriodendron simplex*, N., (*L. Meekii*, Heer in part, Atane, Greenland) Amboy Clays, New Jersey and Long Island.

Two New Florida Plants.

The sets of plants collected in South Florida by the late Dr. A. P. Garber, and distributed by him, could not have been all alike, for I find in mine the two following species, not before reported, so far as I know:

1. *Jussiæa acuminata*, Swz. It was labelled "*Ludwigia cylindrica*, Ell? Manatee, S. Fla., Dec., 1877. Coll. A. P. Garber, M.D." Laid aside for further examination, I took it up a few weeks ago, and made it out by the aid of Grisebach's Flora. By request, Dr. Britton has compared it with No. 2,559 of Wright's Cuba Collection, and says it is exactly the same.

2. *Sponia micrantha*, Decaisne. (DC. Prod., xvii., p. 203, var. D.) Miami, S. Fla, June-July, 1877. Coll. A. P. Garber, M.D. It was numbered 229, and without name. A brief note of Dr. G. calls it "a shrub, six or eight feet high, with small, red berries." In the West Indies it is said to attain the height of a good-sized tree.

THOS. C. PORTER, Easton, Pa.

New Species of Mexican Grasses.*

BY DR. GEO. VASEY.

SPOROBOLUS SHEPHERDI. Culms 10 to 12 inches high, much branched at the base, smooth; leaves 2 to 3 inches long, narrow and acuminate, becoming involute, the lower sheaths loose, inflated, striate, short, the upper one twice or thrice as long; ligule conspicuous, toothed at the apex; panicle about 4 inches long, 1 to 2 inches wide, open, the branches mostly scattered or semi-verticillate, rather erect, slender, subdivided nearly to the base, the branchlets and pedicels long, the latter capillary and flexuous, thickened above; spikelets less than 1 line long, smooth; empty glumes ovate, acutish, a little shorter than the spikelet, thin, not keeled nor nerved; flowering glume ovate, faintly three-nerved, thicker than the outer glumes, sparingly hairy externally; palet nearly as long as its glume and of the same texture. Apparently annual.

A pretty grass, conspicuous for the silvery hue of the spikelets. The panicle has the aspect of *S. ramulosus*, but is much larger, with a fuller panicle and larger spikelets. Named for A. H. Shepherd, Esq., of Batopilas, who extended great hospitality and assistance to Dr. Palmer, the collector.

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* Continued from the December number.

SPOROBOLUS ANNUUS. Culms 4 to 6 inches high, branched at the base; leaves 1 inch long or less, narrow; panicle 2 to 3 inches long, about 1 inch wide, branches of the panicle mostly single and scattered, about 1 inch long, filiform, sparsely flowered; spikelets about 1 line long, on scabrous pedicels twice to many times as long; empty glumes ovate, acuminate, sometimes awn-pointed, about one-fourth longer than the flower, smooth; flowering glume oblong, obtuse, hairy externally; palet about as long as its glume, hairy on the nerves.

This small, annual grass is remarkable for its long, pointed, empty glumes, longer than the flowering ones. It has the habit of the preceding, but is easily distinguished. It is mixed in some of the sets with that species.

SPOROBOLUS RACEMOSUS. Annual; culms 8 to 12 inches long, slender, decumbent and branching below, some of the branches floriferous and exserted, others included in the sheaths, lower joints short and numerous; leaves short, mostly about 1 inch long, very narrow, sheaths short, striate, somewhat inflated, ligule short and truncate; panicle 2 to 3 inches long, meagre, open, branches few, hispidulous, mostly single and alternate, ½ inch to 1 inch long, simple or sparingly subdivided, few flowered; spikelets racemose, about ½ line long, short pedicelled, the pedicels glandular hispid, appressed, becoming reflexed; empty glumes purplish, about half as long as the spikelet, oblong, obtuse or erose, nerveless, nearly equal; flowering glume ovate, acutish, thicker than the outer glumes, smooth; palet similar in texture, nearly equaling its glume.

Mixed in some of the sets with *S. ramulosus* and *S. annuus*. Both were collected near Noragachie in sandy or gravelly places near water.

NOTE ON BOUTELOUA. In the Agricultural Grounds we have cultivated, the past season, two species of *Bouteloua* from seed collected by Dr. Palmer in Chihuahua, which have been distributed to some extent as *Bouteloua Palmeri* and *B. major*. Although these are of extraordinary size and luxuriance, and with some marked floral characters, they probably should be referred as varieties, one of *B. hirsuta* and the other of *B. oligostachya.* No. 24 of the collection, erroneously distributed as *B. hirsuta*, is one of the forms (*B. oligostachya*, var. *major*), but smaller than those raised from seed. The other form was not represented in the collection.

Notes on Some Subjects Referred to in the December Bulletin.

Euphrasia officinalis (xiii., p. 232) is by no means rare in Nova Scotia and the Island of Cape Breton. It usually grows on exposed hilly ground, on dry, gravelly or sandy knolls, or sunny slopes, where the grass is stunted. It abounds on many such spots on the hills overlooking Bedford Basin, the large sheet of water into which Halifax Harbor opens out at its upper or northern end; also on the hills around Sydney Harbor, Cape Breton, and in many other places in this and neighboring Provinces. As in Britain, it is here confined mostly to localities not far from the seashore. In the Manual Dr. Gray speaks of the American form as "a dwarf variety, with very small flowers," and in the Synoptical Flora, the Maine and Canada plant is treated as a European introduction—the indigenous form of the White Mountains being referred to the variety *Tatarica*, under which De Candolle, in the Prodromus, includes the eastern European and Asiatic plant. I know of no reason for regarding our common Canadian form otherwise than as indigenous. It is possible that stray introduced plants may occur occasionally, for a few days ago a specimen was brought me to name as large as any I have seen in England, and with the robust look of the English plant.

Alchemilla vulgaris, also noticed on same page of BULLETIN, in an editorial note, was first observed at Lucyfield, Halifax County, in the summer of 1864. There is but one patch, which I have seen in flower during every subsequent season; but it does not spread. Botanists here have not noticed it elsewhere. It would consequently be of interest to note the "roadside" localities more specifically in a future number of the BULLETIN. The *Alchemilla* is an introduced plant of European origin (as you state); and I had not regarded the one patch found in 1864 as sufficient to establish it as a permanent immigrant. If you will kindly indicate the other places where observed in Nova Scotia, I shall be glad to visit them, and report whether the plant appears to be taking hold. I have a specimen from Newfoundland. It would be an additional favor if minute details were given of the Nova Scotia locality for the exceptionally rare *Schizæa pusilla*, which we are anxious to find. Grand Lake, as its name implies, is a very large lake, but my summer residence is within walking distance of the civilized end of it, so that it would be quite easy for me to visit any part of its shores.

The notices of *Erica cinerea* and *Calluna* on Nantucket are very interesting. A case has occurred here of the artificial introduction of *Calluna*, within the last few years, in a manner somewhat similar to that indicated for the *Erica cinerea* on Nantucket. My friend Mr. P. Jack had a collection of native ferns sent from the Island of Arran, on the west coast of Scotland, which he planted on his property of Bellahill, near Halifax, in a wild, shaded, moist situation, in the immediate vicinity of which were patches of black bog earth. A few years ago, subsequent to the planting of the ferns, he observed springing up two young healthy plants of *Calluna vulgaris*. They had germinated in the black earth at the side of a path, and are now growing vigorously, and promise to establish a permanent patch; but they have not yet flowered. The facts detailed by Mr. Willis, and the one just mentioned, show that *Erica* and *Calluna* may both be introduced in the soil attached to the roots of imported trees or plants. I would like, however, to add that this in nowise invalidates the belief of many of us that *Calluna* is an indigenous American plant. It apparently belongs to the class of American plants, now not small, which are both "indigenous and introduced." The facts have been pretty fully printed, and I shall be glad to send a copy of my paper, published some years ago, to any botanical student who may desire to look into them. The *Calluna*, like *Corema*, is apparently one of the remnants of a lost Atlantic Flora.

With reference to a previous notice of *Corema Conradii*, it may be mentioned that I observed immense quantities of it this season growing, in a perfectly gregarious, heath-like manner, in the western part of Kings County and the adjoining eastern part of Annapolis County, in this Province. It was particularly noticed between the railway stations of Bridgetown and Aylesford, on the Windsor and Annapolis Railway, and will readily catch the eye of every botanical traveler over the line.

Will Mr. Redfield kindly say whether it was the larger or smaller petalled variety of *Œnothera biennis* that was observed by him, and noted in his Island Flora (p. 246). I have noticed the latter on our shores, the former inland in one or two places.

Mr. Safford's observations on the time of fruiting of *Buxbaumia aphylla* are quite in accordance with those made on the Sidlaw Hills in Scotland, and in Nova Scotia, where it is found in good condition only in spring-time. GEORGE LAWSON.

Euphrasia officinalis, L., is abundant at St. John and St. Andrews, N. B., and, though I have no notes of it elsewhere, I think I have seen it at other seaports on the Bay of Fundy. It is found by Prof. Fowler at Bathurst, in the extreme north of the province, where it is also abundant. Though regarded here as a native, its being most frequent near the older settlements would seem to favor the opinion that it has been introduced.

JAMES VROOM, St. Stephens, N. B.

[*Alchemilla vulgaris* was found at Digby, on the outskirts of the town in August, 1879, on the road toward "the Joggins." The locality for *Schizæa* at Grand Lake was near the "civilized end of it" where the railroad runs. There is an island at this end and there was either a saw-mill or tannery. At a point on the shore between the outlet of a stream carrying saw-dust from the above and a line drawn from the eastern end of the island to the shore, on a hummock six inches above the stony beach, growing among the roots of *Osmunda regalis* and *Pogonia ophioglossoides*, there were found a few small plants of this rare fern, with the dry brown fronds of the previous year still attached. In a letter from A. H. McKay, dated September 10th, 1881, he says: "The margin of the Lake had been overrun by fires last fall and I fear the plants are destroyed." He made a careful search for it at that time.—ED.]

Notes from Queens County, Long Island.

The following plants, which, to the best of my knowledge, have not been reported from Long Island, seem sufficiently rare to deserve notice:

Dentaria diphylla, L. Flushing, near Kissena Lake (R. B. Lawrence); rare.

D. laciniata, Muhl. Abundant near Durkee's Pond, Flushing.

Arenaria lateriflora, L. Winfield; abundant.

Euonymus Americanus, L. Bayside; the erect form, not common.

E. Europæus, L. Frequent in Bowne's Woods, Flushing; a probable escape from the nurseries in the vicinity.

Trifolium hybridum, L. Lawrence Station.

Geum strictum, Ait. St. Ronan's Well, Flushing.

Viburnum cassinoides, L. Valley Stream.

Aster Radula, Ait. Valley Stream, L. I. R. R. (toward Springfield.)

A. acuminatus, Michx. Glen Cove, near railroad station.

Helianthus decapetalus, L. St. Ronan's Well, Flushing.

Coreopsis discoidea, T. & G. Springfield; together with small form of *Bidens connata*.

Lampsana communis, L. Flushing; roadside.

Mimulus moschatus, Dougl. Perfectly at home and scattered over a boggy swamp, about two miles east of Locust Valley, on right hand side of Oyster Bay road.

Veronica Anagallis, L.; var. *latifolia*, Britton. Flushing.

Mentha sativa, L. With *Mimulus moschatus*.

Symphytum officinale, L Roadside near Flushing cemetery.

Myosotis verna, Nutt. St. Ronan's Well and College Point.

Cuscuta arvensis, Beyrich. On *Aster linariifolius*, L. Cedar Hurst.

Solanum Carolinense, L. Flushing.

Asarum Canadense, L. In woods on old Astoria road near Corona.

Chenopodium murale, L. Glen Cove and Flushing.

C. hybridum, L. Flushing.

Trillium erectum, L.; var. *album*, Pursh. Thorne's Woods, Great Neck.

Amianthium muscætoxicum, Gray. Valley Stream, L. I. R. R. towards Hewlett's; rather abundant in a small piece of moist woodland.
JULIUS A. BISKY, Flushing, L. I.

On the Occurrence of Sherardia Arvensis, L., in Canada.

Among the most recent introductions into this country is this beautiful little *Galium*, or Blue Field-madder. It was first found growing at Ottawa, near the city limits, by the roadside, and in tolerable abundance. For three years in succession it was collected there, and fifty or sixty specimens were gathered by the writer during that lapse of time. *Sherardia arvensis*, L., is a well-known and easily recognized European species occurring rather abundantly in fields and meadows, along fences, etc., across the Atlantic. With it were found the following species: *Stellaria media*, *Polygonum aviculare*, *P. hydropiper*, *P. Persicaria*, *Trifolium pratense*, *T. repens*, *Cnicus arvensis*, *Anthemis Cotula*, *Ranunculus acris*, *Leontodon Taraxacum*, *Chenopodium album*.

This very handsome though modest little plant was in blossom from the middle of June to the month of October, and produced seed.

HENRY M. AMI,
Ottawa Field Naturalists' Club.

A New Reagent for Lignin.

In Ber. d. deutsch. bot. Ges. (Vol. IV., p. 301) Hans Molisch recommends Thymol as a reliable reagent for coniferin. As this glucoside has been proved to be present in all lignified tissues, Thymol will rank with phenol, phloroglucin and indol as a reagent for lignin. The slightest traces of coniferin will be detected by means of this reagent, if applied in the following manner:

A twenty per cent. solution of Thymol in absolute alcohol is diluted with water as long as the liquid remains perfectly clear, *i. e.*, as long as no Thymol is precipitated. Then potassic chlorate in excess is added, the fluid is allowed to stand for several hours, and finally filtered. The section to be examined is moistened with the solution and a drop of concentrated hydrochloric acid is added, when, in a few instants, the cell-walls which contain lignin will assume a beautiful greenish-blue color. J. S.

Index to Recent American Botanical Literature.

Abies Menziesii—(Garden, xxx., 491.) An account of its introduction and cultivation in England.

Absorption of coloring Matter by the living Protoplasm of Vegetable Cells.—George Lincoln Goodale. (Am. Journ. Sci., xxxii., p. 486.)

Prof. Pfeffer has shown that when living vegetable cells are placed in very dilute solutions of certain coal-tar coloring matters, the protoplasm becomes distinctly colored, and remains tinged for a time. The best results are obtained by placing roots with root hairs in pure water with one ten-thousandth of one per cent. of any of the "methyl" colors except blue.

Agricultural Colleges.—How shall Botany be taught in.—A. N. Prentiss. (Am. Nat., xx., p. 970; from American Horticulturist.)

Black Rot (*Physalospora Bidwellii, Sacc.*)—*Botanical Character of.*—F. Lamson Scribner. (Bot. Gazette, xi., pp. 297–302; one plate.)

Botany of California and Parts Adjacent.—Studies in the.—V. Edward Lee Greene. (Bull. Calif. Acad. Sci., ii., pp. 125-154; one plate. Reprinted.)

In this contribution to the botany of western America Mr. Greene discusses "Some Genera which have been confused under the name *Brodiæa*," and proposes an entirely new arrangement of these Liliaceæ. He points out that nearly everything thus far written on these plants has been based on herbarium specimens alone, and shows that in drying, some characters which are apparent in the field may become obscured. The present paper is the result of five seasons' field study, during which many of the species have been examined as they grow. The genera adopted are *Brodiæa*, Smith, with six species; *Hookera*, Salisb., with eight; *Triteleia*, Dougl., with thirteen, and *Behria*, Greene, n. gen., with a single species, *B. tenuifolia*, Greene. Six of these species are new to science.

The second part of Mr. Greene's paper is on new or noteworthy species, mainly from the islands of Santa Cruz and San Miguel. Here are described *Helianthemum occidentale; Ceanothus arboreus;* two Lupines; three new species of the genus *Syr-*

matium, Vogel, which is distinguished from *Hosackia; Heuchera maxima*, an enormous plant for this genus; *Galium buxifolium; Matricaria occidentalis; Bæria Burkei; Cnicus fontinalis; Stephanomeria tomentosa;* two new species of *Malacothrix; Calais Clevelandi* and *Dowingia concolor.* The plate illustrates *Lyonothamnus asplenifolius.*

Canadian Filicinæ.—Additions to.—T. J. W. Burgess. (Trans. Roy. Soc. Canada, iv., pp. 9–18; reprinted.

Since the publication of the revision of Canadian Filicinæ by Professor Macoun and Dr. Burgess, in 1884, several additional ferns have been collected in Canada; among these are *Polypodium vulgare*, L., var. *Cambricum*, Willd., from Port Simpson, British Columbia; *Adiantum pedatum*, L., var. *rangiferinum*, Burgess, n. var., is a peculiar form, having "pinnules longer stalked, convex on the lower border, rising from the rachis at an acute angle, gradually tapering at the base, deeply cleft into narrow, toothed lobes on the upper side, rounded from below upward at the outer extremity, sori few." This also is from British Columbia. The varieties *marginatum*, *ramosum* and *multifidum* of *Scolopendrium vulgare*, Smith, have been collected near Woodstock, N. B. The discovery of *Aspidium Oreopteris* on Mt. Dawson has already been recorded; specimens referred to typical *Aspidium aculeatum*, Sw., were found by Mr. J. R. Anderson at Port Simpson, British Columbia.

Carices.—A Preliminary Synopsis of North American, including those of Mexico, Central America and Greenland, with the American Bibliography of the Genus.—L. H. Bailey, Jr. (Proc. Amer. Acad., xxii., pp. 59-157; reprinted.)

In this valuable paper Mr. Bailey gives us the results of his recent studies of sedges. The genus *Carex* is divided into two sub-genera; Eucarex, Cosson, contains the species bearing separated staminate and pistillate spikes, three-parted styles and triquetrous achenia; Vigneæ, Koch, include the species with staminate flowers borne at the base or apex of the pistillate spikes and having lenticular achenia. As these sub-genera are considered in the order named, the arrangement of the species becomes very different from that of Boott in Gray's Manual, or that of Dewey in Wood's Classbook. The following changes in the nomenclature of species as published in recent American botanical works are made; the accompanying notes may be of interest:

C. rostrata, Michx., becomes *C. Michauxiana*, Bœckl., Michaux's name being preoccupied by Withering for a very different plant; the southern, slender forms of *C. folliculata*, L., with slightly awned scales are referred to var. *australis*, Bailey; *C. lupulina*, Muhl., is *C. lurida*, Wahl., the older name, the *C. lupuliformis*, Sartw. is referred to this as var. *polystachya*, Bailey, and *C. Bellavilla*, Dewey, as var. *divergens*, Bailey; *C. pulla*, Gooden. is *C. saxatilis*, L., an Old World species and *C. miliaris*, Michx., is made var. (?) *miliaris*, Bailey, its systematic position being uncertain; *C. ampullacea*, Gooden, is *C. rostrata*, Withering, the latter name having one year's priority and *C. utriculata*, Boott, is referred to this as var. *utriculata*, Bailey; *C. Vaseyi*, Dewey, is included in *C. monile*, Tuckerm.; *C. Olneyi*, Boott, is regarded as a hybrid of *bullata* × *utriculata* and *C. tentaculata*, var. (?) *altior*, Boott, as one of *tentaculata lurida; C. spissa*, Bailey, is a gigantic new species from the southwest; *C. lanuginosa*, Michx. is *C. filiformis*, L., var. *latifolia*, Bœckl.; *C. aristata*, R. Br. and *C. mirata*, Dewey, are reduced to *C. trichocarpa*, Muhl., var. *aristata*, Bailey; *C. paludosa*, Gooden., is *C. acutiformis*, Ehrh. and is introduced in Eastern Mass.; *C. rigida*, var. *Bigelovii*, Tuckerm., is regarded as *C. vulgaris*, Fries, var. *hyperborea*, Boott; *C. miliacea*, Muhl., is *C. prasina*, Wahl., the older name; *C. salina*, Wahl., is given as ranging from Boston to Labrador in salt marshes: it may be noted that the late Dr. Knieskern supposed that he had this species from Ocean County, N. J., as is recorded in his Catalogue, but his large herbarium is destroyed, and none of his specimens of the plant extant; *C. Barbaræ*, Dewey, is a curious species (poorly represented in the Herbaria) from Santa Barbara, Cal., and a few other stations, under which Mr. Bailey places *C. Schottii*, Dewey and *C. Prescottiana*, Olney. Olney's label with the original of *C. Barbaræ* in Herb. Torrey reads "guess *C. cryptocarpa*, Meyer"; *C. gynandra*, Schw., is reduced to *C. crinita*, Lam., var. *gynandra*, Schw. & Torrey; Muller's Nos. 1336, 649 and 1977 from Orizava fall in this Section, Cryptocarpeæ, perhaps in *C. Ehrenbergiana*, Bœckl., which by a misprint, we suppose, is said to have spikes one to four *feet* long; *C.*

sempervirens, Olney, of the Pacific slope is *C. frigida*, Allioni; *C. irrigua*, Smith, is *C. Magellanica*, Lam.; *C. Hartwegii*, Boott, of Mexico, is *C. cladostachya*, Wahll, and is Muller's No. 2014; *C. polystachya*, Wahl., occurs in Porto Rico, an additional station to those in Cuba and Jamaica cited by Mr. Bailey; *C. Smithii*, Porter, is referred to *C. triceps*, Michx.—erroneously, we believe, for the plant appears to possess characters which should place it at least in varietal rank; *C. longirostris*, Torrey, has recently been collected by Dr. Best in Hunterdon Co., N. J., a station which slightly increases its southeastern distribution as given by Mr. Bailey; *C. Knieskernii*, Dewey, is supposed to be a hybrid of *arctata* × *formosa*, and *C. Sullivantii*, Boott, as a hybrid of *gracillima* × *pubescens; C. glabra*, Boott, becomes *C. venusta*, Dewey, var. *glabra*, Bailey; *C. flaccosperma*, of Gray's Manual, is *C. glaucodea*, Tuckerm., while the true *flaccosperma*, Dewey, is a far southern plant; a convenient key is given to the varieties of *C. laxiflora*, Lam., var. *striatula*, Carey (var. *blanda*, Boott), being the commonest; *C. ptychocarpa*, Steud, is another species of this group distinguished by its glaucous leaves, small, sessile staminate spike and short culm, ranging from northern New Jersey southward; *C. Meadii*, Dewey, is reduced to *C. tetanica*, Schk. var. *Meadii*, Bailey; *C. inops*, Bailey, is a new species of the Montanæ from Mt. Hood, Oregon; *C. tenax*, Chapm., is *C. Chapmani*, Sartwell; *C. Fraseriana*, Sims, is *C. Fraseri*, Andrews; *C. arenaria*, L., the "Sand Carex" of Europe, was collected by McMinn near Norfolk, Va.; *C. retroflexa*, Muhl., is reduced to *C. rosea*, Schk. var. *retroflexa*, Torrey; *C. stellulata*, Gooden., is *C. echinata*, Murray and its var. *scirpoides* becomes var. *macrostachys*, Bœckl., of the latter, in which *C. sterilis*, Willd., is included; our common forms of *C. canescens*, L., are referred to its var. *alpicola*, Wahl., and the var. *polystachya*, Boott, of New England and British America is recognized as such; *C. lagopodioides*, Schk., is *C. tribuloides*, Wahl., and *C. cristata*, Schw., is made var. *cristata*, Bailey, of the latter: we had regarded *cristata* as sufficiently distinct; *C. straminea*, Schk., is stretched to include an immense number of forms: *C. mirabilis*, Dewey, becomes its var. *mirabilis*, Tuckerm.; var. *congesta*, Boott, is a globose-headed form from California and Oregon; var. *maxima*, Bailey, is the *C. Wrightii*, of Olney, and we think is more than a variety; *C. alata*, Torrey, is also reduced to varietal rank, probably correctly; *C. fœnea*, Willd., is the var. *fœnea*, Torrey, and in this form the species is found in Mexico (Muller, 1953; Berlandier, 1972); var. *mixta*, Bailey, is a large form from the Pacific coast, and var. *moniliformis*, Tuckerm., is the common sea-beach plant referred in Gray's Manual to *fœnea*, var. *sabulonum*, and is *C. silicea*, Olney. We prefer to regard this plant as of specific rank, its distant silvery spikes affording constant characters; the vars. *aperta*, Boott, and *invisa* of W. Boott are also accepted by Mr. Bailey.

Altogether 289 species are enumerated—224 of Eucarex and 65 of Vigneæ. The bibliography is arranged chronologically and is practically complete, and an excellent index to all species and groups mentioned is appended. N. L. B.

Carpenteria Californica, Torrey.—(Bot. Mag., xlii., Tab. 6,911.)

A beautiful plate and interesting description of this showy shrub, whose native habitat is still uncertain.

Catalogue of Canadian Plants. Part III. Apetalæ.—John Macoun. (Published by the Geol. & Nat. Hist. Survey of Canada, pamph. 8vo., pp. 228, Montreal, 1886.)

The third part of this model plant catalogue has recently been distributed; 82 pages are devoted to an enumeration of the Apetalæ, much attention being given to the distribution of the forest trees; 10 species of pine have been found and 11 of oak; the willows, elaborated by Mr. Bebb, number 49 species and 14 varieties.

The next 99 pages are devoted to additional species and localities for Polypetalæ and Gamopetalæ. *Stellaria graminea*, L., is claimed as native in the Eastern Provinces; *Ilex glabra* has been found in Nova Scotia; a new station for *Littorella*, at Lake Utopia, St George, New Brunswick, is announced. This chapter of addenda brings the number of species of Dicotyledons up to 2205; 47 pages are occupied by a very complete index to species mentioned in the three parts now published.

Dog-tooth Violets, Erythroniums. (Garden, xxx., pp. 520, 521; Plate 573.)

It would seem that in England our pretty little Adder's-tongue is prized as well as its more showy sister, *E. Dens-Canis*, of which a beautiful plate is given.

Energy in Plant Cells.—T. H. McBride. (Pop. Sci. Month. Vol. xxx., pp. 180-184.)

Houstonia cærulea. (Garden, xxx., p. 451, illustrated.)

Merulius lachrymans, the dry rot fungus. (Gard. Chron. xxvi., pp. 626, 627, fig. 125.)

An account of its destructiveness and the various methods of preserving timbers from its devastation.

Mesozoic Floras of the Rocky Mountain Region of Canada.—Sir J. W. Dawson. (Trans. Roy. Soc. Canada, iii., Section iv., pp. 1–22; four plates.)

An additional list of Phanerogams and Ferns collected mainly by Dr. G. M. Dawson and T. C. Weston. Several species of *Ginkgo* have been found in the Kootanie Series, which is regarded as the base of the Cretaceous in Western North America. The fossil flora of these strata consists almost entirely of Ferns, Cycads, and Conifers, while in the upper beds, numerous species of Angiosperms occur.

Ornamental Trees of Canada. (Garden, xxx., pp. 492, 493.)

Extract from a paper read by Mr. C. Gibb before the Montreal Horticultural Society.

Plan for Laboratory Work in Chemical Botany.—Lillie J. Martin. (Bot. Gazette, xi., pp. 311-313; also reprinted.)

Puccinia Malvacearum in Massachusetts.—W. G. Farlow. (Bot. Gazette, xi., pp. 309, 310.)

Remarks upon the Journey of André Michaux to the high Mountains of Carolina in December, 1788.—C. S. Sargent. (Am. Journ. Sci., xxxii., pp. 466–473.

During last season Prof. Sargent explored the head waters of the Savannah River with the main object of finding Michaux's station for *Magnolia cordata* and to determine the character and geographical distribution of this doubtful species. It is interesting to follow the progress of Michaux and his Cherokee guide as given in his Journal, and trace with Prof. Sargent 98 years later the course taken, and furthermore to find the same trails, and the same plants still in existence. He was able to identify the little "arbuste," with "feuilles denticulées" as *Shortia* and to obtain it in the same locality that Michaux described. In another station in the vicinity it is reported that "there are rods covered with it." The conclusion is reached that *M. cordata* is but one of the rarer forms of *M. acuminata* and Dr. Gray recognizes it as such and appends a description of *M. acuminata* var. *cordata.*

Revision of the North American Violets.—Memoranda of a.— Asa Gray. (Bot. Gazette, xi., pp. 253-256 and 289-293.)

The species are divided into two sections; the first of these again into six groups based upon differences in the foliage and stigma. *V. delphinifolia*, Nutt., is referred to *V. pedatifida*, Don., the earlier name. *V. palmata*, L, is regarded as the type of the numerous forms usually considered under *V. cucullata*, Ait., the latter being now var. *cucullata*, Gray, of the former. *V. renifolia*, Gray, is reduced to *V. blanda*, Willd., var. *renifolia*; the western *V. aurea*, Kellogg, is *V. præmorsa*, Dougl.; our common Dog Violet is to be known as *V. canina*, L., var. *Muhlenbergii*, Gray. The second section,—that of the pansies,—is represented only by the plant referred to *V. tricolor*, L., var. *arvensis*, DC.

Sylva of North America.—Some additions to the.—C. S. Sargent. (Bot. Gazette, xi., pp. 313-315.)

Professor Sargent detected in April last, *Termimalia Buceras*, B. & H., *Myginda integrifolia*, Lam., (*M? latifolia*, *Chapm*), and a new arborescent palm which Dr. Wendland names *Pseudophœnix Sargentii*, all on the Keys of Southern Florida.

Synopsis of North American Pines, based upon Leaf Anatomy.— John M. Coulter and J. N. Rose. (Bot. Gazette, xi., pp. 256-262, and 302-309; illustrated.)

Following up the late Dr. Engelmann's studies of the leaves of Conifers, Professor Coulter and Mr. Rose have endeavored to find characters in the anatomy of pine needles on which to base an arrangement of the species. Transverse sections cut from near the middle of the needle were used. The primary basis of classification is the occurrence in the one group of a single fibrovascular bundle, and in the other of two; other characters are the presence or absence of thick-walled cells next the epidermis and resin ducts; the distribution of stomata, and the position and relative size of the resin ducts.

Torsion in the Hollyhock, with some Observations on Cross-fertilization.—Thomas Meehan. (Proc. Phil. Acad. Nat. Sci., 1886, pp. 291, 292.

Botanical Notes.

The Flora of Ceylon, Especially as Affected by Climate, is the title of a very interesting paper read by Henry Trimen at the meeting of the British Association, September, 1886, and published since in the Journal of Botany for October and November. The reader will be impressed by the abundance and luxuriance of introduced plants even around the Buddhist temples, and will be astonished to learn that as early as 1520 South American and West Indian plants were introduced in the East Indies. In considering the native flora, the island is divided into two large areas—Northeast, or dry, and Southwest, or moist. The former is rarely visited, the latter is well known. These are again subdivided according to elevation. The cultivation of rice and other grain has caused the destruction of nearly all the lowland forests, and a stony, worthless region, covered with Lantana from the West Indies, and a small native bamboo replace them. In a few cases the native trees remain, and a vivid account is given of the plants in these "hot, steamy forests." An interesting and restricted flora is here found, remarkably like the Malayan; while the hill-flora is generically similar and specifically distinct from that of the mountains of South India. One of the remarkable features of the Ceylon flora is the large number of species which are peculiar to the island, nearly 30 per cent. of them being found nowhere else in the world, and they seem to be concentrated in the wet Southwest region. The clearing of the hill country for coffee estates has left a belt between the lowlands and the montane zone, in which nearly all trace of the native vegetation is lost, its place being taken by "an army of cosmopolitan exotic weeds." This was the great region for epiphytic Orchids, and the few remaining strips of forest show a great variety of species. The montane zone is forest-clad to the summit, and the trees are nearly all evergreen, with thick and leathery leaves. Ferns and Orchids are abundant in these hill forests, and here, too, may be found many familiar genera, such as Anemone, Viola, Ranunculus, Rubus, etc.

The "Dry Country" of Northeastern Ceylon was once "the granary of India," and numerous ruins of religious edifices and irrigation works would seem to indicate a large native population engaged in the cultivation of rice; but the forest covers everything now, and it is remarkable how completely it has regained possession. It is to be noted that this dry forest is also evergreen, so that deciduous trees form but a small portion of the forests of Ceylon.

In conclusion, it is stated that no other British colony possesses so complete a system of botanical and experimental gardens as Ceylon, and these have been located in each of the climatic districts, five in number, offering to students great facilities for botanical research. The director expresses a wish that these advantages may be more freely availed of by English students.

Some rare and interesting mosses are enumerated and described by G. Venturi in the Nuovo Giorn. Bot. Ital. for October, 1886. They were collected by the Abate Antonio Carestia in the Piedmontese Alps, and have been critically compared by the author. One species of *Blindia* is still uncertain, seemingly allied to *B. acuta*, var. *Arenaria*, Molendo, to which the name *B. trichodes*, Lindb., may be applied. The following are the rarer species: *Encalypta spathulata*, C. Müll, *Hypnum Richardsoni*, Mitl., *Mnium subglobosum*, Br. & Sch., *Grimmia montana*, Br. & Sch., and *Barbula chionostoma*, n. sp., described in the Rev. Bryol., 1885, No. 5, and more completely characterized here.

Index Lichenum Brittanicorum. In current numbers of Grevillea, the Rev. J. M. Crombie gives a list of British Lichens according to the most recent Nylanderian arrangement.

The Genus Eremostachys, Bunge. In Fascicle X. of "Descriptiones Plantarum Novarum et minus cognitarum," printed in Vol. IX. of the Transactions of the St. Petersburg Botanical Garden, E. Regel publishes a monograph of this genus of Labiatæ, illustrated with ten plates. 39 species are described, all Asiatic, against 27 enumerated by Bunge.

A Synopsis of the Rhizocarpeæ, by J. G. Baker, is concluded in the December number of the Journal of Botany. One American species, *Pilularia Americana*, A. Br., is described, of which *P. Valdiviana*, Philippi, is a synonym.

Proceedings of the Club.

At the meeting held December 14th, there were twenty-four persons present, and Vice-President Hogg presided. Miss E. Cannon and Mrs. J. Osborne Wright were elected active members, and Mrs. Catharine Starbuck and Mrs. Charlotte C. Pearson, corresponding members.

An amendment to Article III. of the Constitution was made, substituting for "An Associate Editor," the words "Associate Editors, not to exceed five in number."

P. H. Dudley exhibited a fine specimen of *Polyporus giganteus*, which was obtained by Dr. Draper, November, 1886, from an apple tree at Hastings-on-the-Hudson. It was 14 inches long, 8 inches wide, and weighed 5 pounds when collected. Dr. C. F. Millspaugh presented a fine plate and specimens of *Euphorbia Nicæensis*, Allioni, collected at Vestal, Broome County, N. Y., on the Susquehanna, where it is abundant and attains a greater size than it does on the shores of the Mediterranean. It adds a new plant to the Flora of the United States. A note was received from Prof. T. C. Porter, accompanying specimens of *Jussiæa acuminata*, Sw., and *Sponia micrantha*, DC., collected by Dr. Garber in Florida.

Mr. Hollick read the paper announced on "*Cerastium arvense*, L., and its Varieties," illustrated by specimens.

Mr. Bisky reported and exhibited twenty-one plants new to the Flora of Long Island. Dr. Britton read a communication from C. E. Smith on a method of drying and poisoning plants in order to preserve their color. Samples of the felt used and photographs of the presses were shown, as well as mounted sheets of *Baptisia tinctoria*, *Linaria vulgaris*, and other black-drying plants with their colors preserved. He also remarked that on p. 416 of Vol. III. of Hemsley's Botany of Central America, it is stated that no definite station for *Typha* is known in Mexico; he exhibited specimens of *Typha latifolia*, L., No. 1,880 of Müller, from Orizava, collected in swamps along the Rio Blanco.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XIV.] New York, February, 1887. [No. 2.

Notes on Diatoms.

By C. Henry Kain.

Within the last few years the number of students of the Diatomaceæ has vastly increased. The literature of the subject has been greatly enriched, the classification of species is more definite, and the valuable aid afforded to geologists by the investigation of newly discovered fossil deposits has drawn attention to the fact that the study of these forms is not without practical results. The researches in regard to the structure of the diatom frustule, notably those of Dr. J. H. L. Flogel, Prinz and Van Ermengem, and Hon. J. D. Cox, while productive of much discussion, are likely to lead to valuable conclusions. Some observers are devoting their attention to the study of the life history of the Diatomaceæ, and the number of such students should be increased, for there are many points in this connection that require verification and further investigation. It is understood that our veteran diatomist, Prof. H. L. Smith, to whom we are indebted for the system of classification now so generally adopted, has prepared a work upon this subject, and its publication is hoped for at an early day. Very little has been done in this country in the way of figuring the species of particular districts, and monographs upon our remarkable fossil deposits would be very desirable.

Most unfortunately, many are only familiar with diatoms as they are received in a cleaned state, except, perchance, such as may be met with in a casual gathering of pond life. Such persons would often be pleased to make original collections, but for lack of knowledge in regard to where to look for and how to gather these little plants. This knowledge is only acquired after considerable experience. In the writer's early experience, most of the collections made resulted in securing a few diatoms and a good deal of mud. The efforts to get rid of the fine silt were usually so vexatious that the whole lot was often thrown away in disgust. The collector should learn that it pays to gather specimens as free from extraneous matter as possible. It is far easier to do this on the spot than to depend upon the various devices used for getting rid of sand, etc., after cleaning. It is not difficult to make clean collections when one has learned where to look, when to look, and how to collect.

Along the coast of New Jersey and Long Island extends a series of shallow bays or sounds, which are separated from the sea by strips of sandy beaches. These bays abound in spots where various species of marine algæ flourish luxuriantly, and upon these algæ many species of marine diatoms frequently occur in great abundance. Frequent inlets connect the bays mentioned with the ocean, and it is at the mouths of these inlets, between tide marks, that the richest and purest gatherings of marine forms may often be obtained. Sand bars which are bare at low tide are often prolific spots, but the best places are usually in the little coves which are always found near the mouths of the inlets. Here the water forms gentle eddies, and the diatoms have a chance to settle. At the time of lowest tide, the sand ripples may often be found densely packed with diatoms, forming a deposit which varies, according to the species, from a light brown to a dark chestnut color. This deposit, with as little sand as possible, should be scraped up and put into a wide-mouthed bottle until it is perhaps one-third full. Then fill up with water and shake vigorously. Allow the sand to settle for a few moments, and pour off the water, which is now quite brown in color on account of the diatoms it retains. Again fill the bottle with water, shake, let settle and pour off as before. A number of bottles can be filled in succession in this way, and if those first filled are allowed to stand for fifteen or twenty minutes, the diatoms, unless they are some of the very small species, settle to the bottom. The supernatant water can then be poured off and the bottles again filled successively. In this way, a large collection of very clean material may frequently be made at one spot, during a single tide. A little collecting lens is almost indispensable in this work, for it often happens that after one has collected at one spot all he desires, another spot a few yards away attracts his attention, but, as it presents the same appearance to the eye, it is neglected. The collector should not pass any favorable looking spot without examination, for pure gatherings of quite distinct species may often be made within a few yards of each other. One other piece of advice may not be amiss. When one finds a really good gathering, be sure to collect *plenty* of it, for the same spot may be visited again at the very next tide, and either nothing collected, or the species found may be quite different.

It is our design to call attention to some localities along the New Jersey coast which have been found prolific, and the first of these to which reference will be made is Shark River, at Ocean Beach, on the New York and Long Branch Railroad, about nine miles below Long Branch. As it is easily reached by rail from either New York or Philadelphia, microscopists of those cities would be richly repaid for a visit to the locality. The writer is only familiar with the species found there during the months of July, August and September, but doubtless a visit during the open weather we sometimes have in winter would yield rich results, for some marine species flourish best during the winter months.

Early in July, in the sand ripples on the south side of the inlet of Shark River, *Cocconeis excentrica* may be found abundant and pure. It is needless, perhaps, to remark that the time of extreme low tide is the only proper time for making collections here. Some distance farther up the river, on the south side, near the foot of B street, a broad flat occurs which is bare at low water. Here *Navicula lyra*, *N. forcipata* and *N. humerosa* may be found, sometimes well separated. Still farther up the river, and on the same side, *Pleurosigma æstuarii* and many species of *Amphora* occur. A little farther up, at the foot of C street, the brown patches on the sand are usually worthy of investigation, for here pure gatherings of *Amphora* may be made; *A. plicata*, especially, is often found here in a very pure state. Later in the season, other forms may be met with in these localities, *Navicula inflexa*, particularly, being very abundant at the inlet, late in August.

On the north side of the river the species are often quite different from those on the south side at the same season. On this side, just within the inlet, is a large flat which is uncovered at low tide. Here various species of *Amphora* may be found; *A. aponina* being usually very abundant during August and September. On the more sheltered portion of this flat, where the flow of water has not been so rapid, the very delicate *Nitzschia closterium* may often be found in great abundance, also the tiny *Navicula oculata.* On some parts of this flat, however, the collector may meet with a great disappointment. Spots will be found where diatoms are very abundant, but so embedded in gelatinous matter as to be almost worthless, for this gelatinous material is very difficult to get rid of in cleaning. Besides, it retains a great deal of sand with the diatoms. The best plan is to avoid collecting such stuff, but collect as near the water's edge as possible. Here the diatoms have been washed clean by the constant action of the water and deposited in little winrows along the sand-ripples, the flocculent matter having been washed away. Upon the large flat just east of the wagon bridge, *Navicula lyra* and *N. forcipata* may often be found abundantly, but the collections made here are not apt to be so pure. Besides the species enumerated as occurring nearly pure, there are many other species which may be found more or less abundantly in mixed gatherings. These may be gleaned from the list at the close of this paper.

Above the railroad bridge, the river broadens out into a bay over a mile in width, and this is a veritable treasure house to the diatomist. In some parts of this bay, at certain seasons, the growth of algæ is so dense that it is difficult to row a boat through it. In June there is comparatively little to be found here, but, as the season advances, the growth of algæ and of diatoms is more prolific. By the second or third week in August, *Achnanthes brevipes* is exceedingly abundant upon *Polysiphonia Harveyi*, about two hundred yards west of Buhler's wharf. Farther west, *Striatella unipunctata*, *Synedra fulgens*, the ordinary species of *Grammatophora*, *Epithemia musculus* and *Melosira nummuloides* are often very abundant. Here every piece of seaweed should be separately inspected and so placed in bottles as to mix species as little as possible. A mile west of Buhler's, in the shallow water at Long Point, cream-like masses of pure *Melosira nummuloides* may be sometimes met with. On the north side of the river, a little above where the north channel opens out into the bay, *Schizonema Americanum* grows in great abundance. It makes its appearance in light brown tufts upon eel-grass, about the last week in July, and continues for ten days or two weeks, varying somewhat in the time of its appearance in different seasons. Amongst it may sometimes be found *Berkleya fragilis*, a species which, like the Schizonemæ, also occurs in gelatinous fronds.

Between the railroad and the broad part of the bay are a number of islands, and, in the shallow pools found on these, very interesting collections of mixed species may be made. The wonderful *Bacillaria paradoxa* is abundant, and several species of *Pleurosigma* are found in considerable numbers.

Occasionally after a heavy easterly storm, but frequently at other times, the tide carries in from the sea great quantities of several of the smaller species of algæ. Upon these, *Licmophora tincta*, *L. flabellata* and the various species of *Grammatophora* are often very abundant. On such occasions the collector has but to anchor his boat in the current and catch the specimens as they float by, examining each separately. They should be so placed in bottles as to keep the various species as well separated as possible. Valuable collections may often be made in this manner.

The appended list of species is by no means exhaustive, as every new gathering is likely to furnish others not previously observed. The collections were made principally during the months of July and August, and extend over a period of about six or seven years.

DIATOMACEÆ OF SHARK RIVER, N. J.

Achnanthes brevipes, Agardh, common on algæ, south side of bay.

Amphiprora lepidoptera, Greg., occasional, south side, foot of B street.

Amphora aponina, Greg., abundant and pure on flat near inlet.

A. cymbifera, Greg.
A. excisa, Greg.
A. lævis, Greg.
A. lævissima, Greg.
A. lanceolata, Cleve.
common near inlet.
A. naviculacea, Donkin, occasional, near inlet.
A. obtusa, Greg., common near inlet.
A. plicata, Greg., abundant and pure, south side, foot of C street.
A. proteus, Greg., common, foot of B street.
A. robusta, Greg., common, near inlet.
Bacillaria paradoxa, Gmelin, (*Nitzschia paradoxa*, Grun.), common in ditches and pools west of railroad bridge.
Berkleya fragilis, Grev., on eel-grass, south side of bay, August 1.
Biddulphia aurita, Breb., occasional on algæ in bay.
B. Baileyi, W. Smith, occasional near inlet and in river mud.
B. lævis, Ehr., occasional near inlet and on algæ in bay.
B. pulchella, Gray, occasional on algæ in bay.
B. rhombus, W. Sm., occasional near inlet and in mud.
B. turgida, W. Sm., occasional near inlet and in mud.
Campylodiscus cribrosus, W. Sm., occasional near inlet and in mud.
Cocconeis excentrica, Donkin, abundant and pure, south side, near inlet, July.
C. scutellum, Ehr., abundant on algæ, particularly *Ceramium*, and on zoöphytes, especially *Sertularia*.
Coscinodiscus eccentricus, Ehr.
C. lineatus, Ehr.
C. omphalanthus, Ehr.
C. radiatus, Ehr.
C. subtilis, Ehr.
occasional near inlet and in mud.
Dimeregramma marinum, Ralfs, occasional near inlet.
Epithemia (*Hantzschia*) *marina*, Donkin, near inlet.
E. musculus, Kütz., common on algæ, south side of bay.
Grammatophora islandica, Ehr.
G. marina, Kütz.
G. serpentina, Ehr.
G. subtilissima, Bailey.
on small brown algæ floating in from sea.
Homœocladia sigmoidea, W. Sm. (*Nitzschia fasciculata*, Grunow), common in ditches near railroad bridge.

Licmophora flabellata, Agardh, on algæ in bay.

L. tincta, Grun., abundant on small floating algæ and on zoöphytes.

Melosira nummuloides, Agardh, abundant in bay near Long Point.

M. sulcata, Kütz., common near inlet and in mud.

Navicula forcipata, Grev., common, on flat near bridge and foot of B street.

N. granulata, Breb., rare, near inlet.

N. Hennedyi, W. Sm., common, near inlet and on flat near bridge.

N. humerosa, Breb., abundant, foot of B street.

N. Indica, Grev., occasional, near inlet and on flat near bridge.

N. inflexa, Ralfs, abundant and pure, in sand ripples near inlet, south side.

N. lyra, Ehr., abundant, on flats near wagon bridge and at foot of B street.

N. oculata, Breb., common, on flat near inlet, north side.

N. palpebralis, Breb., occasional, near inlet.

N. permagna, Bailey, occasional, at foot of B street and in mud.

N. peregrina, Ehr. (*Pinnularia*), ommon, in ditches on north side near bridges.

N. prætexta, Ehr., common, near inlet at foot of B street.

N. pygmæa, Kütz., occasional, near inlet.

N. retusa, Breb., occasional, near inlet.

Nitzschia bilobata, W. Sm., occasional, near inlet.

N. closterium, W. Sm., abundant, on flat near inlet, north side.

N. littorea, Grun., occasional, near inlet.

N. longissima, Ralfs., occasional, near inlet, north side.

N. marina, Grun., common, at foot of B street.

N. vivax, W. Sm., common, at foot of B street.

Pleurosigma Balticum, W. Sm., common, in pools above railroad.

P. angulatum, W. Sm., occasional, in pools above railroad.

P. fasciola, W. Sm., common, on flat near inlet, north side.

P. elongatum, W. Sm., occasional, near inlet.

P. hippocampus, W. Sm., common, near inlet and in pools above railroad.

P. decorum, W. Sm., occasional, near inlet.

P. macrum, W. Sm., occasional, on flat near inlet, north side.

P. obscurum, W. Sm., rare, on flat near inlet, north side.

Podosira compressa, West (*Druridgia geminata*), occasional, near inlet and in mud.

Rhabdonema Adriaticum, Kütz., common, on algæ in bay.

R. arcuatum, Kütz., common, with the last.

Rhaphoneis amphiceros, Ehr., occasional, near inlet and in mud; several varieties.

Schizonema Americanum, Grun., abundant, on eel-grass in bay, north side, Aug. 1.

Stauroneis aspera, Ehr., common, near inlet and at foot of B street.

S. salina, W. Sm., common, near foot of B street.

Striatella unipunctata, Agardh, abundant, on algæ in bay, south side.

Synedra fulgens, W. Sm., abundant, on algæ in bay, south side.

Triceratium alternans, Bailey, occasional, near inlet and on flat near bridge.

T. Favus, Ehr., occasional, near inlet and on flat near bridge.

Tryblionella angustata, W. Sm.,
T. Hantzschiana, Grun.,
T. punctata, W. Sm.,
T. scutella, W. Sm.,
occasional, near inlet and in mud.

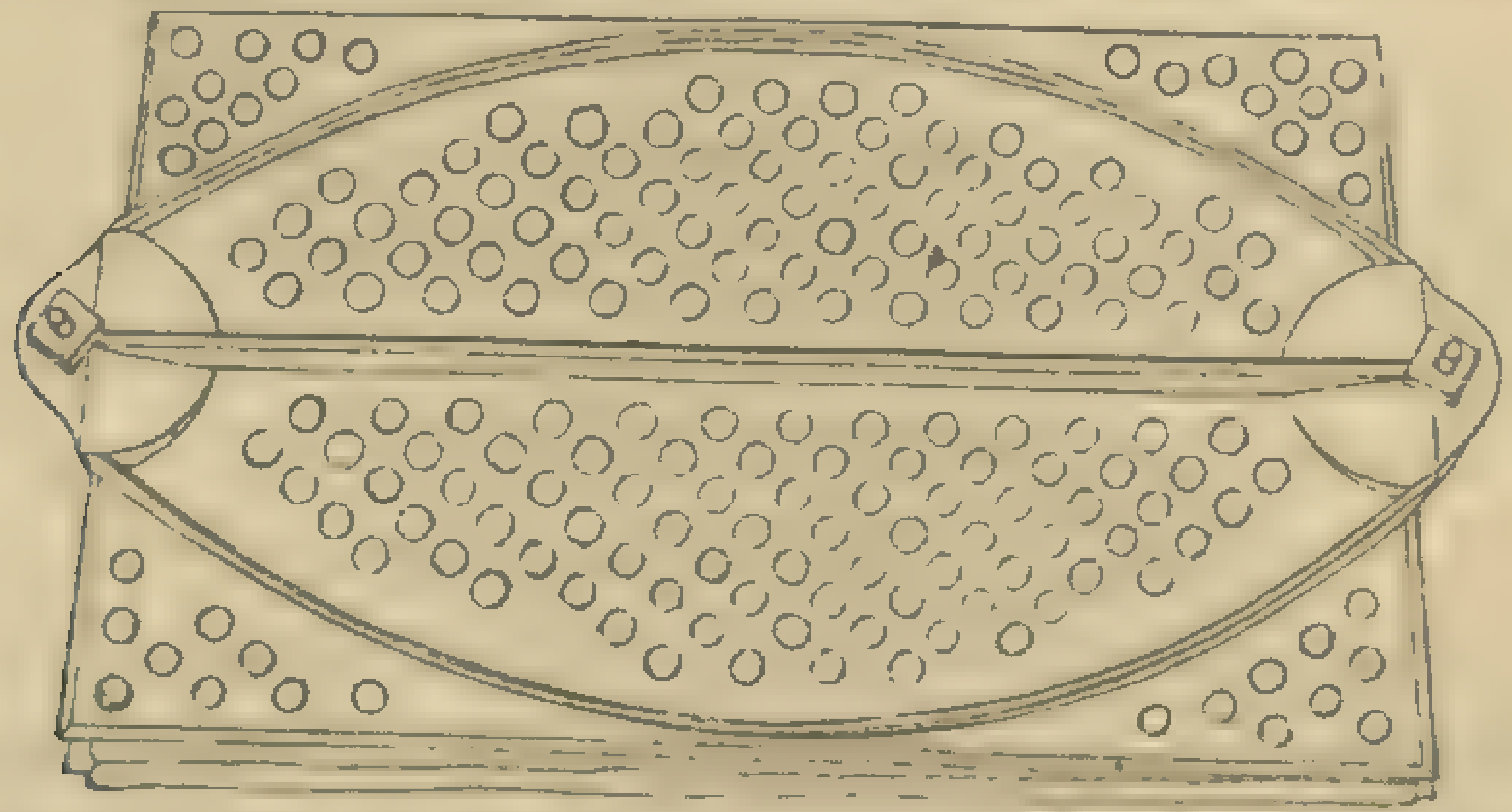
Note on the Inflorescence of Camellia Japonica.

Dr. Gray says that *Camellia Japonica* has "terminal or nearly terminal flowers" (F. F. and G. Bot., p. 76). Bentham and Hooker characterize the genus *Camellia* as having "flores axillares" (Gen. Plant., Vol. I., p. 187), and De Candolle makes exactly the same statement (Prod., Vol. I., p. 529). This contradiction led me to examine closely the inflorescence of a considerable number of plants of the common white, full-flowered variety of *C. Japonica*, and I am satisfied that the facts in the case are as follows: Each twig of one season's growth may or does produce one terminal leaf-bud and one leaf-bud in each axil. Each of these leaf-buds is or may be accompanied by two flower-buds, one on each side, and each subtended by a bract closely resembling the ordinary bud-scales. In other words, the flowers of *C.*

Japonica are, accurately speaking, either latero-terminal or latero-axillary, the terminal and axillary positions, strictly so-called, being pre-empted, as it were, by the leaf-buds. Of course the actual bud development falls far short of the possible. Theoretically, a twig of five leaves might produce twelve flowers. The closest approach to this in the forty or fifty plants examined was six flower-buds on a twig with three leaves, the lower axil being vacant. The commonest case consisted of the terminal leaf-bud and one of its lateral flower-buds, together with a leaf-bud in one or two of the axils. The uppermost leaf is close to the end of the twig, and when the flower-bud is developed opposite this leaf, with the terminal leaf-bud between the two, the exact appearance is produced of a strictly terminal flower and an axillary leaf-bud designed to produce a sympodial continuation of the stem. This appearance vanishes when the flower-bud stands next the leaf, and when both the latero-terminal flower buds are developed the true state of the case begins to be seen. The additional development of a leaf-bud and two lateral flower-buds in the upper axil, producing an apparently terminal cluster of two leaf-buds and four flower-buds, throws still further light on the matter. The partial or complete development of similar triplets of buds in some of the lower axils, and the discovery of undeveloped bud-germs in places where buds theoretically belonged but failed to appear, served to complete the chain of evidence in favor of the view I have advanced.
E. E. STERNS.

A Method of Drying Plants with little Loss of Color.

The press used for drying plants is composed of two cast-iron



plates 12½ by 21 inches, ⅛ of an inch thick, and weighs about 32 pounds. Each plate has two hundred holes in it, ½ an inch in diameter. The pressure is applied by a small screw at each end. Between the plates are two sheets of ox-hair felt, each one inch thick.

The specimens to be dried are laid directly on the felt, without paper, and the press screwed up as tight as can be done with the thumb and finger, to flatten the specimen; then laid flat down, preferably where there is a draft or breeze, propping up the windward end 4 or 5 inches to allow the air to pass under it. At the end of six or twelve hours the press is opened to ascertain if the plants have become limp. If so, the press is left open twenty or thirty minutes. The felt and upper plate are then replaced, but not screwed down. In this condition it is left until dry, which is from one to four days. If the plants show any trace of shrivelling, the screws are applied again to flatten them out.

When dry, the plants are laid between loose sheets of paper for at least four weeks, when they are poisoned. If poisoned sooner, the color in some species is much injured. Ballast plants, however, are poisoned as soon as they are out of the press, as the small insect, *Atropos pulsatoria*, is sometimes found on them in the field. In poisoning all specimens, be careful to poison the end of the stem. *Atropos* attacks the most tender parts first, and gets into the pith of the stem. By poisoning that, he is stopped at once.

There are a few species in which one sheet of paper under and over the plant is used to keep it from the felt; *Galium asprellum*, on account of the hooked prickles; *Cuphea viscosissima* is sticky all over; *Tipularia discolor* has large, waxy pollen masses, which, in drying, form a cement as hard and strong as glue, and the flowers of *Azalea viscosa*, are sticky. The thistles have straight spines, and do not require paper. The use of heat, either fire or sunshine, is a disadvantage, turning the plant black. Standing the press on end or on edge is a disadvantage, delaying the drying. The greater part of the moisture leaves the plant in a vertical line. When the press is on edge the moisture rises across the whole page by the longest and slowest line. When laid flat down it rises through the leaves and through the felt by the shortest and quickest line.

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Index to Recent American Botanical Literature.

Alaskan Plants. F. H. Knowlton. (Bot. Gazette, xi., p. 340.)

A list of 24 species collected by Mr. S. Applegate. The rare *Carex decidua*, Boott, is among the number.

Ambrosia bidentata × *trifida.* Asa Gray. (Bot. Gazette, xi., p. 339.)

A hybrid between these species has been found at St. Louis, Mo., by Mr. H. Eggert.

Asimina triloba. (Lloyd's Drugs and Medicines of North America, ii., pp. 49–60; one plate and cuts in the text.)

Azolla Caroliniana—Note on. S. Henshaw. (Proc. Nat. Sci. Assoc., Staten Island, Dec. 11th, 1886.)

"I first noticed *Azolla Caroliniana* in our lotus pond, about two years ago, and have no doubt it came with some aquatic plants which I received from the South. It was very interesting to me at first, looking like bits of floating moss, and apparently so frail that it was liable to be blown off the surface of the water. It turned out more able to take care of itself than I imagined, however, and the innocent-looking plant in a short time covered the whole surface, crowding out the more robust growing *Nymphæas* and making sad havoc with all the permanent plants in the pond. It even tried to climb the stalks of the lotus, and eventually became such a pest that I tried to skim it off the surface of the water; but it appeared to grow all the faster. I turned the hose on it, and tried to float it off, but it is still here, and I know of no way to get rid of it without destroying all the other aquatic plants in the pond.

"Thinking that it might make itself at home in some of the ponds and streams in the neighborhood, I threw a little of it in the shallow end of Silver Lake, Clove Lake, and along the edges of the swamps. This was on May 10th, 1885. By July 5th of the same year it had spread amazingly, especially in the swamps at the head of Clove Lake, where, by autumn, it had covered every available inch of surface. Where fully exposed to the sun, it assumed a red or rusty appearance and gave rise to many inquiries on the part of people in the vicinity as to what it was and how it came there.

"It has evidently become more or less acclimated, as it lived through the past winter and was abundant throughout this year. I think we may venture to put it among the plants of recent introduction."

Bartonia aurea. Chas. E. Parnell. (Vick's Ill. Month. Mag., x., pp. 9, 10; one figure.).

Bulliform or Hygroscopic Cells of Grasses and Sedges Compared. W. J. Beal. (Bot. Gazette, xi., pp. 321–326; one plate.)

Californian Plants—Two new. Volney Rattan. (Bot. Gazette, xi.. pp. 338, 339.)

Carex—Notes on, viii. L. H. Bailey, Jr. (Bot. Gazette, xi., pp. 328-330; one plate.)

This is an account of the several forms regarded by Mr. Bailey as hybrids. *C. Knieskernii,* Dewey, is considered a hybrid of *arctata* × *flexilis.*

Check-List of North American Plants, including Mexican Species which approach the United States Boundary. H. N. Patterson. Large 8vo., pp. 151; Oquawka, Ill., 1887.

This is by far the handsomest and most complete publication of its kind yet issued. It is printed on heavy paper, in large, clear type, and is remarkably free from errors of spelling and typographical blunders, and gives us a list of North American Phanerogamia and Pteridophyta well representing our flora as it is known to-day. It appears that we have 164 species and 22 varieties of Ferns and Ophioglossaceæ. One *Lechea, L. maritima,* Leggett, is omitted, and *L. thymifolia,* Pursh., which this replaces, should be *L. thymifolia,* Michx.,—the *L. Novæ-Cæsareæ* of Austin; several other well-known species have been overlooked; others, reported or described while Mr. Patterson's work was in press, are also to be added. To provide room for such on the pages, there are spaces left after each of the larger genera. The arrangement of both species and genera is alphabetic. There must, in time, be many changes and additions, and we hope that Mr. Patterson's venture may be so successful that he will feel warranted in issuing other editions.

Costa Rica Ferns—Mr. J. J. Cooper's. J. G. Baker. (Journ. Bot., xxv., pp. 24–26.)

An enumeration of 112 species collected by Mr. Cooper in the forests of Costa Rica and sent by him to the U. S. National Museum, whence they were forwarded to Mr. Baker for determination. *Gleichenia intermedia*, *Adiantum Cooperi*, *Polypodium percrassum* and *P. aspidiolepis*, spp. nn., are described.

Fasciation in Ailanthus and Sumach. W. T. Davis. (Proc. Nat. Sci. Assoc., Staten Island, Dec. 11th, 1886.)

After some general remarks on fasciation, with reference to Dr. Master's work, Mr. Davis said:

"I have observed in my rambles that fire is the chief cause of fasciation in ailanthus and sumach (*Rhus glabra*), but it does not appear to have been mentioned as a producer of this deformity.

"Along the stone wall on the property of the Sailors' Snug Harbor, the vegetation has been burned for several years, the dead stalks standing thick among the summer's growth. After the fire in the spring of 1885 many of the young ailanthus trees became fasciated, the adhesion of branches numbering four and five in some cases, and I counted over twenty good specimens of these deformed stalks in quite a small area. I noticed also that most of the young trees had lost their cylindrical outline and had become extremely angular, though after a whole summer's growth they failed to develop a fasciated stalk. On the other side of the wall, where there had been no fire, the ailanthus trees were entirely normal. In the spring of this year these bushes and young trees were again subjected to the influence of fire, and as the summer proceeded I noted a new growth of deformed ailanthus trees and also a number of fasciated sumach stalks.

"Early this spring I discovered a locality in the vicinity of Richmond where the blackened stems of the sumachs showed plainly that there had been a fire, and in the summer the leaves as well as the stalks became fasciated. Other leaves, though normal in shape and showing signs of adhesion, were much enlarged. The flowers growing on these fasciated stalks, which are also for the most part deformed, are not borne in a single head, but extend a long way down the branch, intermixed with the leaves. This fact seems to prove more conclusively that the adhesion of many branches and not the expansion of one, is the true theory of fasciation.

"A great many districts are burned over in the fall, but I think it is only the fires that take place after growth has commenced in the spring that produce this result."

Flora of our Southwestern Archipelago. Wm. S. Lyon. (Bot. Gazette, xi., pp. 330-336, continued.)

Mr. Lyon gives here a list of the flowering plants and ferns of Santa Catalina Island, 151 in number, and one of San Clemente Island, numbering 81.

Flora of Washington and Vicinity—Additions to the. F. H. Knowlton. (Proc. Biol. Soc., Washington, iii., pp. 106-132; reprinted.)

This paper is supplementary to Mr. L. F. Ward's "Guide to the Flora of Washington," and contains the additional Phanerogamia and Pteridophyta detected in the region up to April 1, 1886, 39 in number.

Rev. E. Lehnert contributes "A Revision of the Musci and Hepaticæ of Washington and Vicinity," and "A List of the Lichens of Washington and Vicinity," both bare lists, without habitat or locality. The changes in nomenclature applicable to species published in Mr. Ward's Guide are noted; new stations for rare species are recorded, and a few corrections to previously published lists are made.

Florida Fungi—Notes on—No. 10. W. W. Calkins. (Journ. Mycol., iii., p. 7.)

Fungous Diseases of the Grape Vine—Report on. F. Lamson Scribner. (U. S. Dept. Agric., Botanical Division, Bull. No. 2, pp. 136; seven plates. Washington, 1886.)

It appears that four species of fungi are principally concerned as vine pests in this country. These are the Downy Mildew (*Peronospora viticola*, De By.), the Powdery Mildew (*Uncinula spiralis*, B. & C.), the Black Rot (*Physalospora Bidwelli*, Sac.), and Anthracnose (*Sphaceloma ampelinum*, De By.). These are all carefully described and beautifully illustrated. The Downy Mildew is found both on our wild and cultivated grapes, and has doubtless been conveyed from the former to the latter. The Powdery Mildew is also a native of America, and attacks both wild and cultivated vines, showing a preference for those of the Vinifera class. The Black Rot is likewise of American origin. Anthracnose is an importation from Europe, and has attracted attention in many places during the past season. Two other less destructive fungi are noted. The prevention and cure of all these diseases are discussed. As appendices to Mr. Scribner's report are papers by Mr. Erwin F. Smith, entitled "Synopsis of Replies to a Circular relative to Grape Mildews and Grape Rots in the United States;" one by Col. A. W. Pearson on "Grape Rot and Grape Mildew;" the third appendix contains fourteen papers on "The Prevention of Mildew—Results of Experiments with various Fungicides in French and Italian Vineyards in 1885," and the fourth is a summary of the results of the congress on parasitic diseases of the vine, held at Florence, Italy, October, 1886. There is a full index to subjects treated and authorities cited.

George Winter—Sketch of. W. A. Kellerman. (Journ. Mycol., iii., pp. 8-10.)

An account of Dr. Winter's life, and a list of his publications on fungi.

Grasses—New. George Vasey. (Bot. Gazette, xi., pp. 337, 338.)

Sporobolus Bolanderi, *Agrostis foliosa*, *Muhlenbergia Neo-Mexicana* and *M. acuminata* are described.

Hierochloa borealis. Walter Deane. (Bot. Gazette, xi., pp. 326–328.)

Hypocreacræ, Synopsis of the North American, with Descriptions of the Species. J. B. Ellis and B. M. Everhart. (Journ. Mycol., iii., pp. 1–6, concluded.)

The number of species of this order described is 161; an index to genera and species accompanies this last part of the synopsis.

Lobelia inflata. (Lloyd's Drugs and Medicines of North America, ii., pp. 63–66; one plate and cuts in the text.)

Magnolia. (Lloyd's Drugs and Medicines of North America, ii., pp. 37–46; concluded.)

In this part there is a full-page engraving of *M. macrophylla*, natural size. Professor Sargent contributes the description of the geographical distribution of the genus in the United States, which is illustrated by a map. The Professor seems to have overlooked the occurrence of *M. glauca* on Long Island, N. Y.

(See BULLETIN, x., p. 95; xii., p. 87.) Dr. Heflebower describes the microscopic structure of the bark, which has a well marked zone of sclerotic cells in the endodermis; a good figure of this is given.

Nymphæa flava, Leitner. (Bot. Mag., Plate 6917.)

Ruppia maritima, L., *in Nebraska*. C. E. Bessey. (Amer. Nat., xx., pp. 1052, 1053.)

Santa Cruz Island. E. L. Greene. (West Amer. Sci., iii., pp. 1–4.)

An account of the physiography of this island, with notes on its peculiar flora. *Castilleia hololeuca*, Greene, n. sp., is described.

Selinum Canadense in Indiana. J. N. Rose. (Bot. Gazette, xi., p. 338.)

Stamens and Glandular Hairs of the Moth Mullein. J. L. Zabriskie. (Journ. N. Y. Micros. Soc., ii., p. 127.)

It is stated that the glandular hairs are advantageously shown on a thin transverse section of the ovary; they are comparatively short and stout, and composed of three or four cells. The gland is a globe about four times the diameter of the hair, and is ornamented with a beautiful closely-fluted pattern below the horizontal diameter. The specimen examined appears to have been a hybrid between *Verbascum Blattaria* and *V. Lychnitis*.

Terfezia leonis, Tul. (*Tuber niveum*, Desf.) J. B. Ellis. (Journ. Mycol., iii., p. 10.)

This species, known as the "White Truffle," was communicated to Mr. Ellis by Mr. A. B. Langlois, who reports it quite common in the red sandy soil of the Red River in northwestern Louisiana. Its home is said to be in northern Africa, though it is not uncommon in southern Europe.

Tsuga Caroliniana. (Gardeners' Chronicle, xxvi., p. 788, fig. 153.)

Prof. C. S. Sargent gives a brief historical account of the Carolina Hemlock, with description, habitat and cultivation. The illustration is by C. E. Faxon.

Tumbleweed—Another. C. E. Bessey (Amer. Nat., xx., pp. 1053, 1054.)

This one is *Psoralea tenuiflora*, Pursh, noticed by Professor

Bessey in southern Nebraska in great loose masses in the railway ditches.

Vinegar and its Mother. F. A. Fernald. (Pop. Sci. Month., pp. 378–384.)

Wild Flowers of Dakota. John W. Dunlap. (Gard. Month., xxix., p. 21.)

It is stated that the *Heliotropium Curasavicum* is extremely abundant along the margins of Long Lake, near Woonsocket, Dakota.

Wind and the Tree-Tops. B. F. Hoyt. (Amer. Nat., xx., pp. 1051, 1052.)

From 156 observations on injuries by the wind to deciduous-leaved trees, Mr. Hoyt concludes that these are generally broken at the crotch, this being the weakest point. The Coniferæ having a central axis and verticillate branching, are seldom broken, but generally torn up by the roots. He advances the hypothesis that "the accumulated effects of the wind have been to develop excurrent forms of tree-top," and queries why the Coniferæ should have this in greater perfection than other plants, suggesting that deciduous trees are injured only when in foliage—which is scarcely true in all cases,—while evergreens, being always in foliage, are more exposed to the wind; also that as the Coniferæ are geologically older than Angiosperms, they have had more time to accumulate the effects of the wind and develop an excurrent form of top. Mr. Hoyt does not take into account the fact that the method of branching of Coniferæ is largely determined by their growth from apical cells.

Zauschneria Californica. (Garden, xxxi., pp. 28, 29, with plate.)

The Californian Fuchsia has brilliant scarlet blossoms with exserted stamens, and is a very showy plant in cultivation.

Botanical Notes.

Concerning Guarana and Coca. The *Oil, Paint and Drug Reporter*, in its issue of January 5, departs from its usual careful habits in printing an extract from the work of Mr. H. Semler in reference to "Kola Nuts, Guarana and Coca." The statements there made are so opposed to the facts that it is difficult to imagine how any one could have made them by accident. Mr. Semler states that "no steps have yet been taken to cultivate the Guarana," whereas there is no considerable amount of Guarana obtained except from cultivated plants. The fruits are not "gathered in October and November," but in January. So far from being sold in the Santarem market at "9d per ℔.," it is difficult at most times to obtain Guarana at 75c. and $1, although the price is exceedingly variable. Guarana is not collected on the Rio Negro for market, or at least not to any extent.

Concerning Coca it is stated that the Bolivian Government derives an annual revenue of £40,000 from the "lease of wild coca shrubs." Now, the wild coca shrub is quite a curiosity in Bolivia, so rarely is it met with, and the government owns no shrubs, either wild or cultivated; nor does its income from the export duty on coca reach anywhere near such a figure as that named. The author's anxiety to have his work become the "standard" is hardly likely to be realized if the whole of it is on a par with this extract. There is a class of writers who sail along the coasts of foreign countries and pick up stray information concerning the interior, and who do much more harm than good. Reliable information, especially concerning South America, can only be obtained by actually visiting the locality, and then depending on one's eyes, religiously excluding the statements of the natives, for "the truth dwelleth not in them."—(H. H. R.)

Botany of the Afghan Delimitation Commission. (Nature, xxxv., pp. 173-174.) This is a very interesting, though too brief, account, by W. B. Hemsley, of the collections made by Dr. Aitchison of the vegetable products of the Perso-Afghan region, collections of great economic as well as scientific importance, as he paid special attention to the drug-producing plants and settled many doubtful questions. The collections contain about 100 new species, and were prepared and packed with great care. The main collection consists of about 800 species and 10,000 specimens, and yet does not include any plants from an altitude of more than 5,000 feet. The plants have not yet been fully worked out, but a full and illustrated report on the whole collection, in which prominence will be given to the economic plants, is promised early next year.

Awards of Botanical Prizes by the French Academy for 1886. The Barbier prize was given M. Eugene Collin for his work on "Structure Anatomique des Substances Medicinales," the Desmazieres prize to MM. Henri Van Heurck et A. Grunow for the "Synopsis des Diatomées de Belgique"; La Fons Mélicocq was divided between MM. Gaston Bonnier et G. de Layens on the one part and M. E. G. Camus on the other for works on the "Flore du Nord de la France," and the Montagne prize to M. le Dr. Qúelet for an "ouvrage precieux," entitled "Enchiridion Fungorum in Europa media et præsertim in Gallia vigentium."—(Comptes Rendus, vol. ciii.)

The Flora of Madagascar. At the meeting of the Linnæan Society of London on November 18th, Mr. J. G. Baker read a paper entitled "Further Contributions to the Flora of Madagascar," in which upwards of 250 new species, seven of them representing new genera, were described. It appears that during the last ten years between 1100 and 1200 new plants have been made known from this island in the Journal of Botany and the Journal of the Linnæan Society.

Alchemilla vulgaris was found in great abundance about Yarmouth, Nova Scotia, by Professor Macoun and myself in 1883, growing in fields, etc., bordering on the sea shore.

T. J. W. BURGESS, M.D.

Magnolia acuminata, Var. *cordata*, Sargent. A correction should be made to the statement on p. 21 of the January BULLETIN, where it is said, regarding *Magnolia cordata*, that Dr. Gray recognizes it as a variety of *M. acuminata*, and appends a description. The description is by Professor Sargent.*

Proceedings of the Club.

The regular monthly meeting was held Jan. 11th; 23 persons present. Vice-President Hogg in the chair.

The following were elected active members: Mrs. P. L. Le Brun, Mrs. D. A. McCredy, Miss C. M. Brewster, Dr. H. H.

* Dr. Gray, [illegible] at he [illegible] [illegible]!

Rusby and Prof. C. Henry Kain, and the following corresponding members: Miss. Maria L. Owen, of Springfield, Mass., and J. Reverchon, of Dallas, Texas.

The reports of officers for the year 1886 were read and accepted.

The election of officers for 1887 was then held, with the following result: President, Prof. J. S. Newberry; Vice-President, Thos. Hogg; Treasurer, F. J. H. Merrill; Recording Secretary, Arthur Hollick; Corresponding Secretary, Miss H. C. Gaskin; Editor, Elizabeth G. Britton; Associate Editors, Jos. Schrenk, F. J. H. Merrill, H. H. Rusby and C. Henry Kain; Curator, Miss M. O. Steele; Librarian, N. L. Britton.

Prof. Schrenk remarked on the mucilaginous coating of the submerged portions of *Brasenia peltata*, and stated that this substance is present also within the tissues of the plant. Dr. Britton called attention to the occurrence of a similar mucilage on the young shoots of submerged *Polygonum Muhlenbergii*, Watson, observed near Andover, N. J., last July.

Dr. Henry H. Rusby gave a brief account of his recent travels in South America and of the general features of the Flora of portions of Chili, Peru, Bolivia and the valleys of the Beni, Madeira and Upper Amazon Rivers.

Dr. Britton exhibited and remarked on Mr. A. H. Curtiss' 8th Fascicle of North American Plants. It contains among other interesting species the following collected at a ballast wharf at Pensacola, Florida: *Nicotiana glauca*, Grah.; *Petunia parviflora*, Juss.; *Pluchea Quitæ*, DC.; *Inula viscosa*, Ait.; *Flaveria contrayerba*, L. and *Acanthospermum humile*, DC.; also *Cestrum diurnum*, L. and *Pluchea odorata*, Cass, escaped from cultivation on Key West.

The secretary of the Histologic and Cryptogamic section reported that there had been held six meetings since the organization on April 6th, at which much valuable information in Histology and "technique," had been contributed. The proceedings will hereafter be more fully reported.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XIV.] New York, March, 1887. [No. 3.

Cerastium arvense, L., and its North American Varieties.

BY ARTHUR HOLLICK AND N. L. BRITTON.

Plates LXIII–LXV.

While botanizing on Staten Island, New York, during the past ten or twelve years, our attention was frequently attracted by a *Cerastium*, which grows abundantly at many places on the serpentine hills, and in no other parts of the Island. This plant agrees in general with the description of *C. oblongifolium*, Torrey, in the Flora of the State of New York, and yet it exhibits such a variety of forms that we were led to collect a large number of specimens and memoranda for comparison. The further the subject was investigated the more interesting it became to us, and finally resulted in the study of not only this plant, but of allied forms from other places. Our studies have resulted in the conclusion that the Staten Island plants are more properly to be regarded as a variety of *C. arvense*, L., and that many other American forms of *Cerastium* are to be referred to varieties of this species, as modified by climate, soil, etc.

In addition to specimens in our own collections and those in the herbarium of Columbia College, others from the following herbaria have been kindly placed at our disposal: Harvard University, United States Department of Agriculture, Academy of Natural Sciences of Philadelphia, and Torrey Botanical Club. In addition to these, we have received specimens and notes from Prof. T. C. Porter, Mr. C. E. Smith, Mr. W. M. Canby, Mr. J. M. Macoun, Dr. J. C. Arthur, Prof. S. M. Tracy, and others.

The following is our proposed arrangement of the North American forms of the species:

CERASTIUM ARVENSE, L. Leaves linear or narrowly lanceolate; those of the stem distant; stem and leaves hairy or nearly smooth; bracts small; capsule equaling or somewhat exceeding the calyx. (Plate LXIV., f. I.)

Spec. Plant., Ed. i., 438; Ed. ii., 628; Ed. iii., 628; Fenzl., in Ledeb. Fl. Ross., i., p. 412; DC., Prodr., i., 419; Syn. Flor. Gall., 395; Hudson, Fl. Angl., 201; Engl. Bot., Pl. 93; Benth., Handbook Brit. Fl., i., 126; Koch, Syn. Flor. Germ., 135; Reichb., Icon. Fl. Germ., vi., Pl. 234, f. 4980; Ettingshausen & Pokorny, Phys. Pl. Austr. ix., Pl. 889; Hartm., Handb. Skand. Flor., 132; Boiss., Flor. Orient., i., 728; Regel, Fl. Ost. Sib., i., 427 and 444; Gay, Fl. Chil., i., 276; Rohrb., Linnæa, xxxvii., 303.

Hook., Fl. Bor. Am., i., 104; Muhl., Cat., 46; Bigel., Fl. Bost., 196; Torrey & Gray, Fl. N. A., i., 188; Eaton & Wright, 188; Torrey, Fl. N. Y., i., 99; Bot. Wilke's Exp., 246; Engelm., Trans. Amer. Phil. Soc., xii., 186; Beck, Bot., 54; Gray, Pac. R. Rep., xii., 41; Amer. Journ. Sci. (II.), xxxiii., 405; Proc. Phil. Acad., 1863, 59; Manual, 94; Wood, Classbook, Ed, 1855, 188; Bot. & Flor., 55; Cooper, Pac. R. R. Rep., xii., 57; Chapman, 50; Darby, 247; Meehan, Flowers and Ferns, ii., pp. 189–192, excl. figure.

Porter, Hayden's Rep., 1870, 473; 1871, 479; Porter & Coulter, Fl. Col., 13; Watson, King's Rep., v., 38 and 417; Bot. Cal., i., 67; Rothrock, Geog. Surv. W. 100th Merid., vi., 71; Willis, Cat. N. J., 12; Britton, Prel. Cat. N. J. Fl., 16; Coulter, Bot. Rocky Mount. Reg., 33; Macoun, Cat. Plants Can., i., 77.

C. incanum, Ledb., Mem. Acad. St. Petersb., v., 540 (fide Regel).

? *C. hybridum*, Muhl., Ind. Fl. Lanc., in Trans. Am. Phil. Soc. (I.) iii., 170.

C. Pennsylvanicum, Hornem., Hort. Hafn., 435; D C., Prodr. i., 420; Spreng., Syst. Veg., ii., 418; Don. Gard. Dict., i., 446.

C. elongatum, Nutt., Journ. Acad. Sci., Phil., vii., 16. ?

C. tenuifolium, Pursh., Fl. Amer. Sept., 321.

Habitat. Throughout northern North America, extending southward along the Alleghanies and the Rocky Mountains; also in the Andean region of South America and in Patagonia. Throughout northern and central Europe and northern Asia.

Var. LATIFOLIUM, Fenzl. Leaves lanceolate to oblong-lanceolate, shorter and broader than in the type; those of the stem closer; stems low, 3 to 8 inches high, pubescent. (Plate LXV., f. 5.)

Var. *latifolium*, Fenzl., and var. *alpicolum*, Fenzl., in Ledb. Flor. Ross., i., 412; Regel, Flor. Ost. Sib., i., 445.

C. strictum, L., Spec. Plant., 3d Ed., 529; D C., Prodr., i., 419.

C. ciliatum, Reich., Icon. Flor. Germ., vi., Pl. 235, f. 4981.

C. pubescens, Goldie, Edin. Phil. Journ., 1822; Richards, Frank. Journ., ed. 2, p. 18; DC., Prodr., i., 420.; Don. Gard. Dict., i., 447.

C. Pennsylvanicum, Hook., *fide* spec. in Herb. Acad. Nat. Sci., Phil.

? *C. arvense*, Richards, Franklin Journey, 10.

Habitat. Arctic and alpine regions of Europe, Asia and North America. Labrador (Steinhaur, Kreuth, in Herb. Gray); Utah (L. F. Ward, No. 539, 1875); Pike's Peak, Colo. (Parry) Franklin

Expedition (Hooker l. c.); and credited by Regel to "Ross Colonie," N. W. America (l. c); Cent. Utah (Parry, Nos. 5 and 6, 1875); Mts. of Colo., 1872 (Torrey); Clear Creek Station, Col. (Newberry).

Var. ANGUSTIFOLIUM, Fenzl. Leaves elongated, linear or narrowly linear-lanceolate; stems pubescent, hoary or glandular. (Plate LXV., f. 7.)

In Ledeb. Fl. Ross., i., 413; Regel, Flor. Ost. Sib., i., 445.

C. arvense, Hook., Lond. Journ. Bot., vi., 75.

C. elongatum, Pursh, Fl. Amer., Sept., i., 321; DC. Prodr., i., 417; Spreng., Syst. Veg., ii., 417; Hook., Flor. Bor. Amer., i., 103.

Habitat. Northern Asia and northwest America. Oregon (Geyer, 284).

Var. MAXIMUM, n. var. Plants strong and stout, 12 to 20 inches high; leaves broadly linear to lanceolate, 2 to 4 lines wide, 1 to 2 inches long, acutish; capsule 1½ times the length of the calyx; lower bracts generally foliaceous. (Plate LXIV., f. 2.)

Habitat. Noyo, Mendocino Co., California (Bolander, Nos. 4723 and 6520); western California (G. R. Vasey), near San Francisco (Mrs. M. K. Curran).

Var. OBLONGIFOLIUM, n. var. Leaves narrowly or broadly oblong, or lanceolate-oblong, mostly obtuse; capsules 1½ to 2½ times the length of the calyx; stems generally taller and stronger than in the type; pubescent. (Plates LXIII., and LXV., f. 6.)

Cerastium, n. sp., Torrey, Amer. Journ. Sci., iv., 63.

C. oblongifolium, Torrey, Fl. U. S., i., 460; Fl. N. Y., i., 99; Darlingt., Florula Cestr., 54, and Fl. Cestr., 3d Ed., 33, in part; Torrey and Gray, Fl. N. A., i., 188, in part; Gray, Man., 94; Wood, Class-book, 188, in part; Bot. & Flor., 55; Beck, Bot., 54?; Tatnall, Cat. Phen. & Fil. Plants, Newcastle Co., Del., 17; Newberry, Cat. Plants, Ohio, p. 14; Porter, in Mombert's Auth. Hist. Lanc. Co., Pa., 583; Walling and Gray's New Topog. Atlas, Penn., 25; Macoun, Cat. Plants Canada, i., 77; Anderson, in Rep. State Mineralogist, Nevada, 118; Meehan, Flowers and Ferns, ii., pp. 189 192; Coulter, Cat. Plants, Indiana, 4; Hollick and Britton, Fl. Richmond Co., N. Y., 8; Patterson, Cat. Plants, Ill., 7; Arthur, Contr. Fl. Iowa, 9; Upham, Cat. Fl. Minn., 32; Ward, Bull. U. S. Nat. Museum No. 22, 68; Tracy, Cat. Plants, Missouri, 15.

C. dichotomum, Muhl., Cat., 46. ?

? *C. bracteatum*, Raf., Proc. Decouv., 36; Poir., Suppl. v., 601; DC., Prodr., i., 420; Don. Gard. Dict., i., 447; Torrey and Gray, Fl. N. A., i., 189.

Habitat. Eastern United States from Virginia to New York;

near Alexandria, Va. (A. H. Curtiss); Washington, D. C. (Vasey, Ward); Montgomery Co., Md. (J. D. Smith); Newcastle Co., Del. (Canby, Commons); Lancaster Co., Penn. (Porter); eleven miles west of Philadelphia (C. E. Smith); and abundant on the hills of Staten Island, N. Y.; also extending westward to the Sierra Nevada; Sandusky, Ohio (Douglass); Ogle Co., Ill. (Bebb); Dixons, Ill. (Vasey); Decorah, Iowa (Holway); Amherstburgh, Ontario (Macoun); Belleville, Ontario (Mrs. Roy); Santa Magdalena Mts., N. M. (G. R. Vasey); near Bozeman, Montana (Scribner).

In the eastern United States, from southern New York to Maryland, this variety is apparently confined to magnesian rocks. On Staten Island it is certainly restricted to the serpentine area; with regard to the Pennsylvania localities, Mr. C. E. Smith writes: "So far as I know or have ever heard, it is unknown in our district (Philadelphia), except in one spot about eleven miles west of the city, where the road to West Chester crosses the serpentine rocks, where it is plenty;" and we have examined a specimen of Dr. Darlington's collecting, marked "Serpentine hill, Westchester, Pa.," while in his "Flora Cestrica," he remarks, "Banks of serpentine rock, frequent;" as to the Delaware stations, Mr. W. M. Canby says, "I do not know of its growing elsewhere in this State, nor anywhere in this region (Newcastle Co.), except on the serpentine, where it is very plentiful," and Mr. A. Commons collected it "on serpentine rock, Centreville, Del." It also appears to grow in other places on magnesian limestone, though we have not been able to verify this to any extent; specimens have been seen by us marked "Banks of Susquehanna, Lancaster Co., Pa., T. C. Porter;" and Professor Porter has sent us specimens from the vicinity of Easton, Penn., at both of which localities magnesian limestone occurs; and the original of Dr. Torrey's *C. oblongifolium* came from a region of magnesian limestone near Sandusky, Ohio. Further south and west than these points we have thus far been unable to follow this interesting association.

In this connection we have thought it a matter of some interest to present the following analysis of the ash of this plant, from specimens collected on Todt Hill, Staten Island, kindly made for us by Mr. Ernest J. Lederle, of the School of Mines:

Silica (SiO_2)	39.85
Alumina and Oxide of Iron (Al_2O_3 and Fe_2O_3)	18.58
Lime (CaO)	9.35
Magnesia (MgO)	19.79

From this it is seen that the magnesia constitutes about one-fifth of the entire ash of the plant, and is present in larger quantity than any other constituent except the silica.

It should be remarked that the specimens seen from about Washington, D. C., and from Montgomery county, Md., are larger than those from the serpentine areas. The same may also be said of the specimens from Amherstburgh, Ontario, said by Mr. Macoun to grow in "damp woods," and also of those from the West. In some respects these approach the forms referred by us to var. *maximum*.

In Meehan's "Native Flowers and Ferns of the United States," Vol. ii., plate 48, is an illustration of one of these large forms, made from a specimen collected in Bergen Park, Colo., at an altitude of 7,000 feet. If this drawing is correct, it very nearly represents our var. *maximum*, but we have not seen any specimens of this from the Rocky Mountain regions.

Between Dr. Torrey's original description in the American Journal of Science and Arts, in 1822, and his later description in the Flora of the State of New York, published in 1843, there is the following discrepancy: In the former the leaves are described as *acute*, and the capsules as *shorter than the calyx*, while in the latter the leaves are described as *mostly obtuse*, and the capsules as *about twice as long as the calyx*. This is, perhaps, to be accounted for by the original imperfect material. The latter description agrees with the characters of our var. *oblongifolium*.

Var. VILLOSUM, n. var. Stem leaves lanceolate to ovate-lanceolate; capsules 2 to 2½ times the length of the calyx; the whole plant densely villous-pubescent. (Plate LXV., f. 8.)

C. *villosum*, Muhl., Cat., 46; Darlingt., Flor. Cestr., 2d Ed., 279.

C. *hirsutum*, ? Darlingt., Florula Cestr., 54. ?

C. *oblongifolium*, Darlingt., Flor. Cestr., 3d Ed., 33, in part; Torr. & Gray, Fl. N. A., i., 188, in part.

Habitat. On serpentine rocks, Lancaster Co., Penn. (Porter);

Chester Co., Penn. (Kilvington, in Herb. Acad. Nat. Sci., Phil.)

This variety is to be regarded as the extreme broad-leaved and hairy form of the species. Its range appears to be restricted to the serpentine barrens of Pennsylvania, where it apparently passes gradually into the var. *oblongifolium.*

Var. FUEGIANUM, Hook., f. Low; smooth; leaves short, small, coriaceous and imbricated, lanceolate to ovate-lanceolate in outline; pedicels solitary, or in few-flowered cymes; capsules somewhat exceeding the calyx. (Plate LXIV., f. 3.)

C. arvense, var. ——, Coulter, in Hayden Rep., 1872, 762, name only.

Collected by Professor J. M. Coulter, Aug. 11th, 1872, at Lower Fire Hole Basin, Yellowstone Park.

This interesting form is identical with the var. *Fuegianum*, Hook. f., in Bot. U. S. Expl. Exp., i., 129 (our Plate LXIV., f. 4), from Fuegia, with specimens of which we have compared it.

As analagous to this remarkable distribution we have that of *Carex Magellanica*, Lam., whose range in North America is from the arctic regions to northern Pennsylvania and Utah.

EXPLANATION OF THE PLATES.

Plate LXIII.—*Cerastium arvense*, L., var. *oblongifolium*, drawn from a living plant collected on Todt Hill, Staten Island, New York, May 26th, 1886.

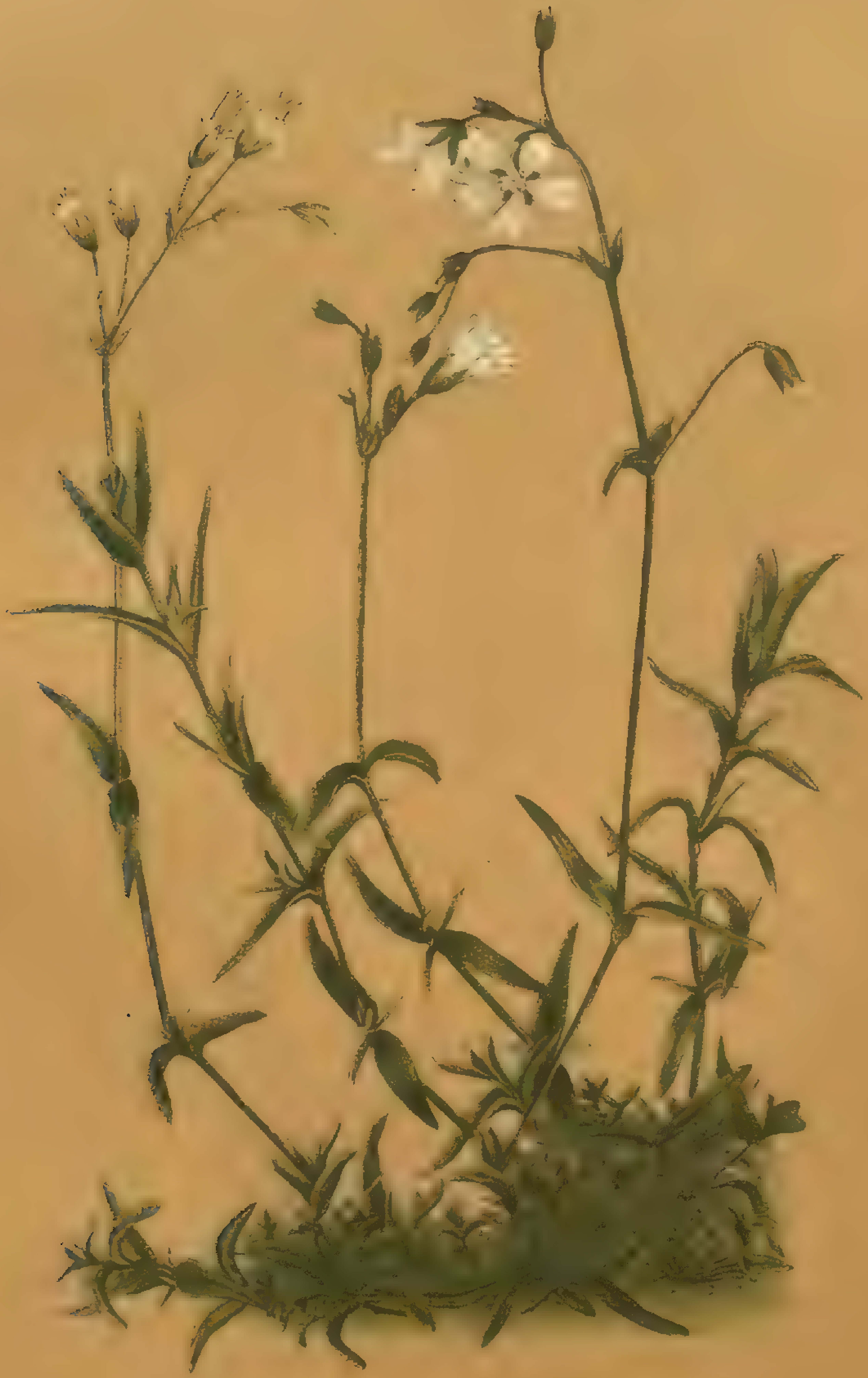
Plate LXIV., fig. 1.—*C. arvense*, L. Drawn from a specimen collected by Prof. T. C. Porter, on the shore of the Delaware River below Phillipsburg, N. J.

Fig. 2.—*C. arvense*, L., var. *maximum* Drawn from a specimen collected by Mrs. M. K. Curran, near San Francisco, Cal.

Fig. 3.—*C. arvense*, L., var. *Fuegianum*. Drawn from specimen collected by Prof. J. M. Coulter, at the Lower Fire Hole Basin, Yellowstone National Park.

Fig. 4.—*C. arvense*, L., var. *Fuegianum*, Hook., f. from Orange Harbor, Fuegia.

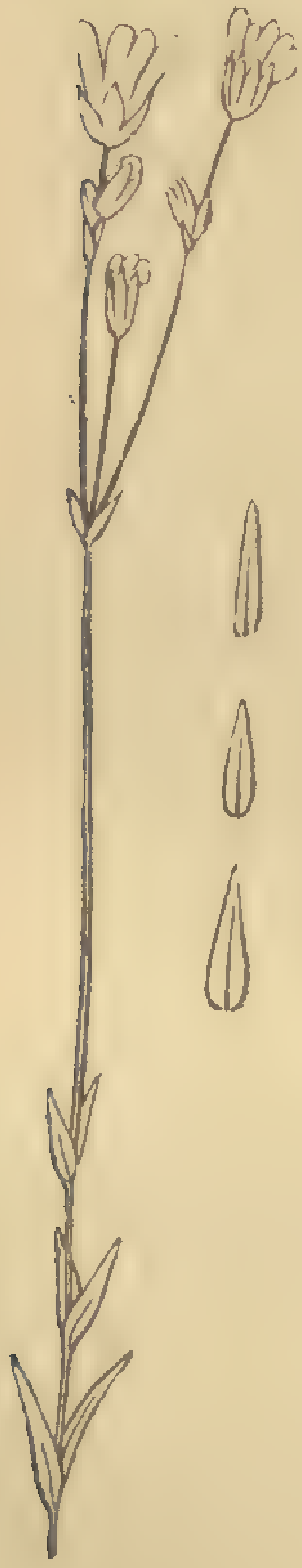
Plate LXV., Fig. 5.—*C. arvense*, L., var. *latifolium*, Fenzl. Drawn from specimen collected in the mountains of Colorado, 1872, by Dr. Torrey.



CERASTIUM ARVENSE L. VAR. OBLONGIFOLIUM

Cerastium arvense, L., and Varieties.

5



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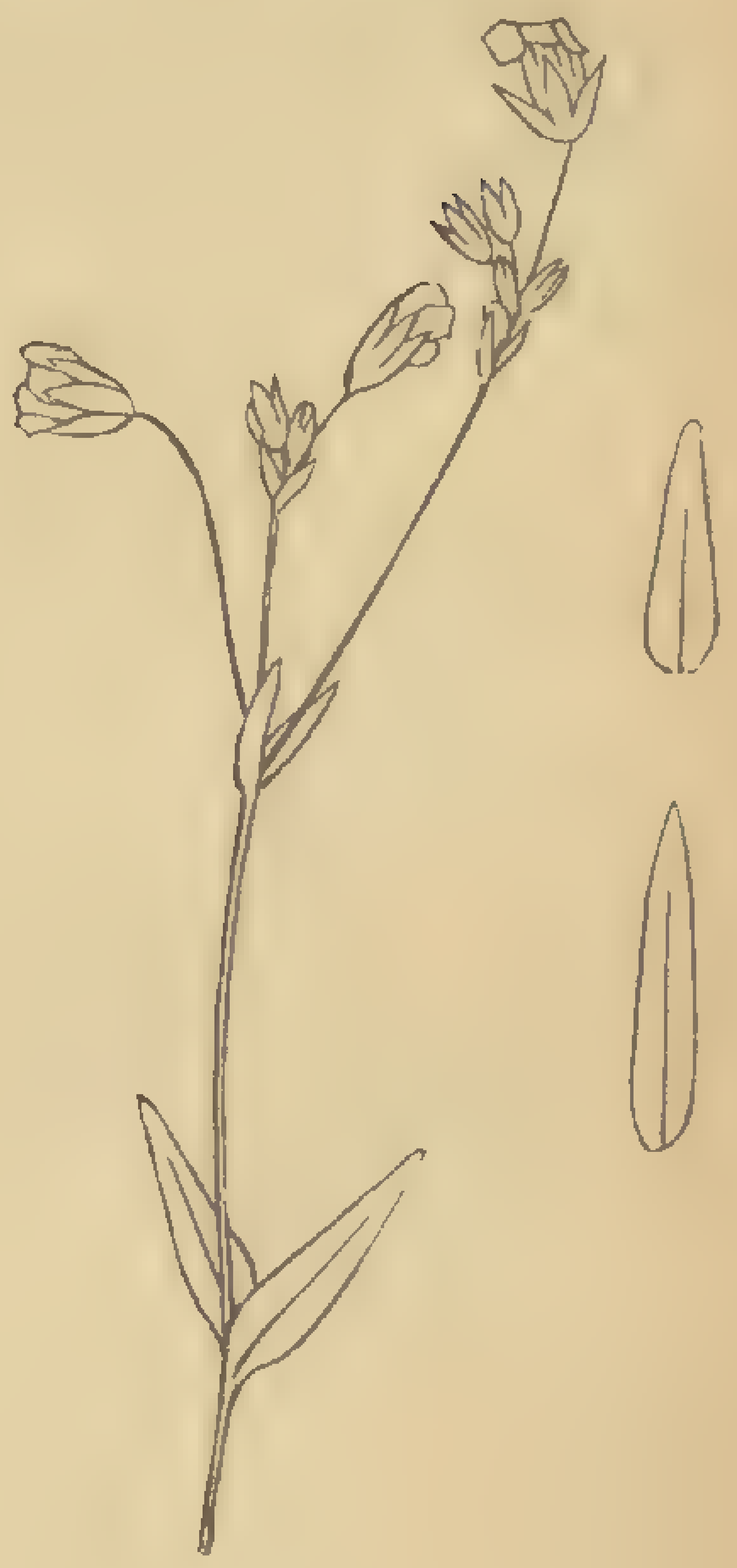

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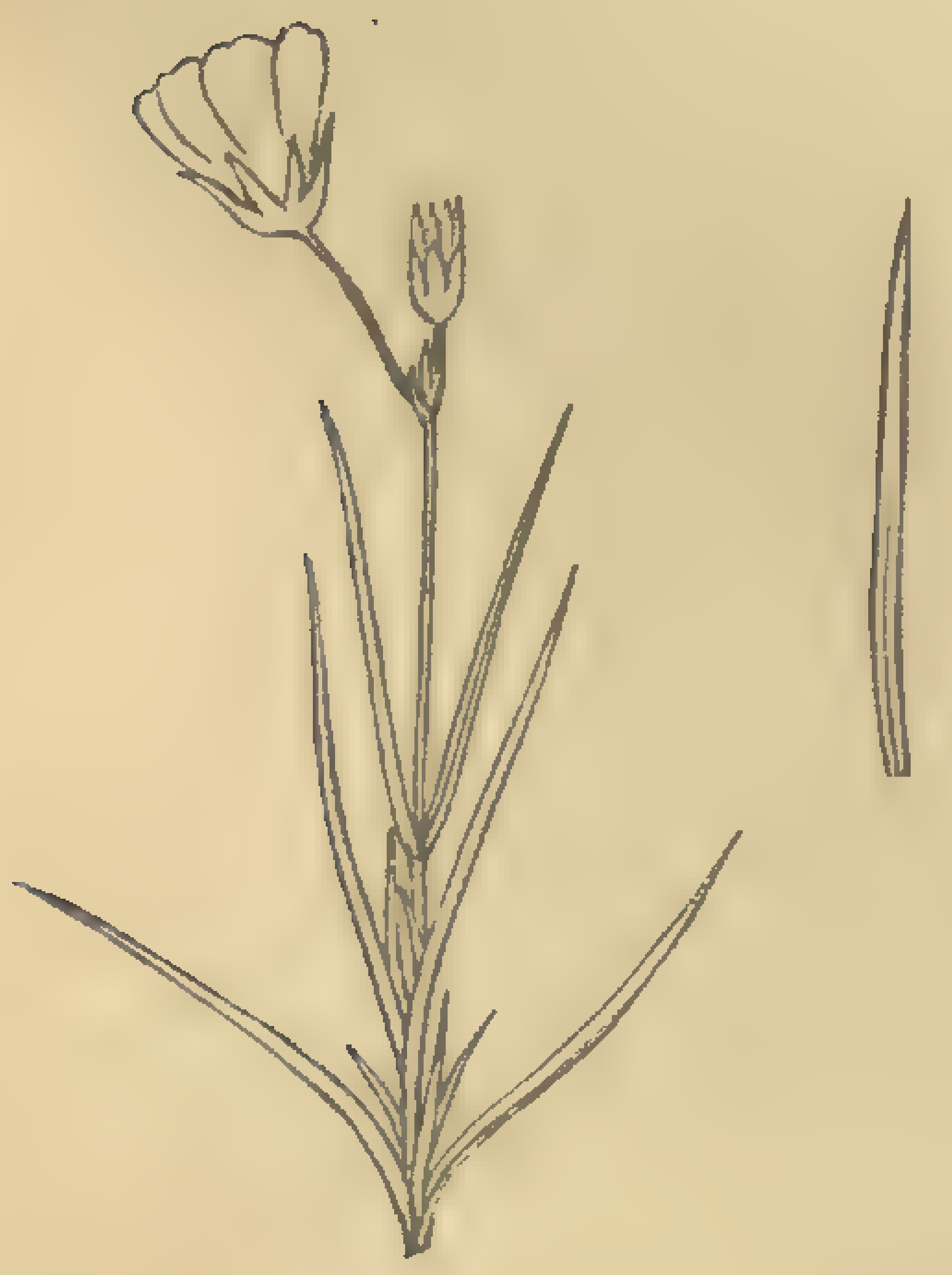

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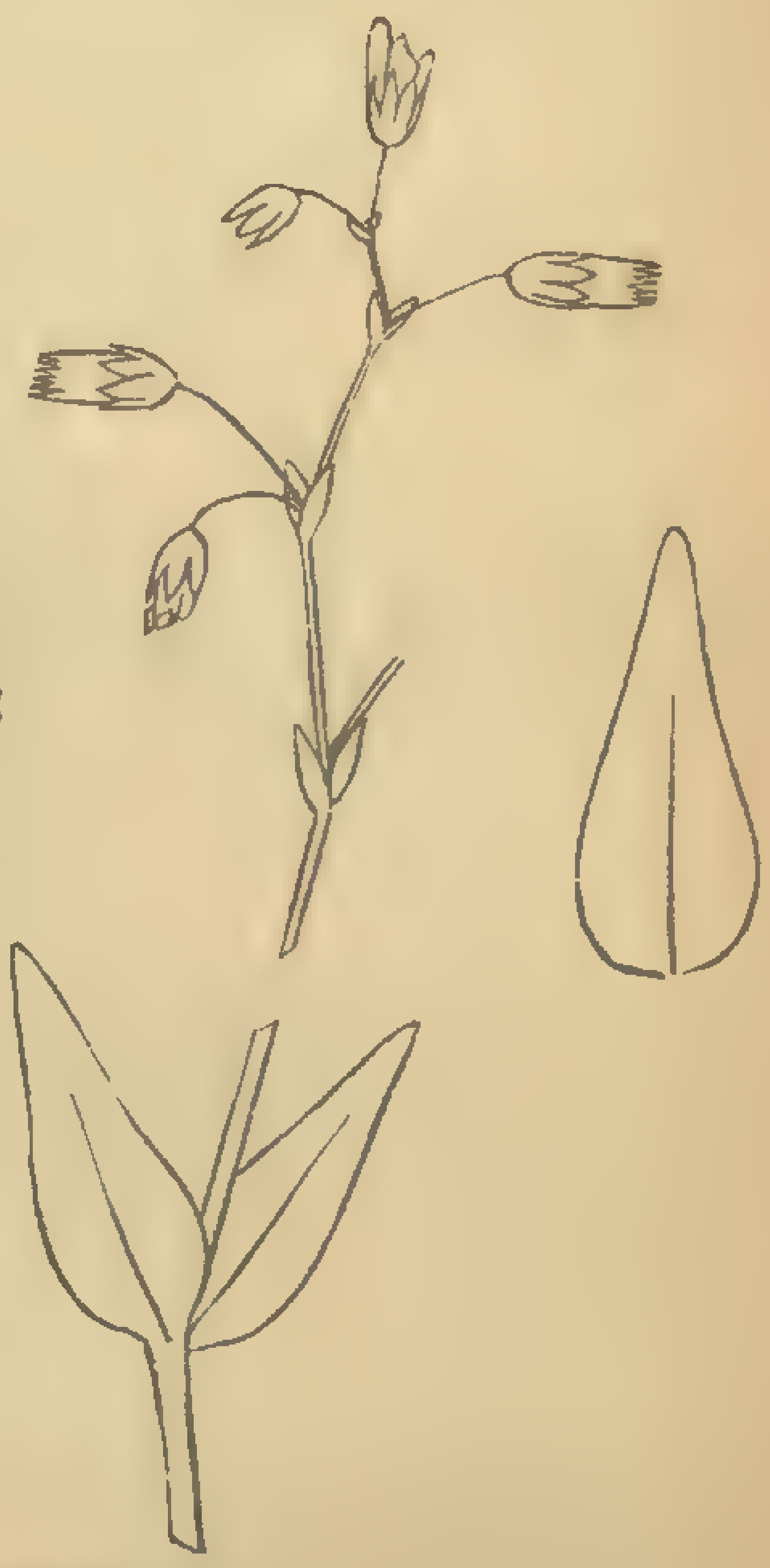

Varieties of Cerastium arvense, L.

Fig. 6.—*C. arvense*, L., var. *oblongifolium*, from Staten Island.

Fig. 7.—*C. arvense*, L., var. *angustifolium*, Fenzl. Drawn from specimen in Dr. Gray's herbarium, collected in Oregon by Geyer.

Fig. 8.—*C. arvense*, L., var. *villosum*. From specimen collected by Prof. T. C. Porter, in Lancaster county, Penn.

All the figures on Plates LXIV. and LXV. were drawn from herbarium specimens.

Some New or Little Known American Plants.

By Thomas Morong.

Eryngium Ludovicianum. A new species belonging to Chapman's scaly fruited section is sent by Rev. A. B. Langlois, from Natchitoches county, Louisiana.

Stem slender, erect, about 18 inches high, diffusely branching; leaves few, the lower oblong, irregularly serrate or incised, the teeth and apex spinescent, 3 to 5 lines wide and 1 to 2 inches long, tapering into a winged petiole which broadens into a clasping base, the uppermost linear, more deeply laciniate, often three-cleft; involucral leaflets six to eight, rigid, entire or dentate towards the base, twice as long as the heads, recurved or reflexed; inflorescence cymose, the whitish heads hemispherical, 2 to 3 lines in diameter, on slender peduncles ½ to 1 inch in length; flowers small, light blue; bracts tricuspidate, longer than the flowers; fruit scaly.

This plant grows in sandy barrens, and may be easily distinguished from *E. Baldwinii*, Spreng., and *E. prostratum*, Nutt., with which it occurs, and with which it might be confounded, by its erect habit, its tricuspidate bracts and scaly fruit.

Myriophyllum alterniflorum, DC. This species, hitherto reported no nearer to us than Greenland, was detected last August by Mr. J. R. Churchill at Sargent's Bay, Lake Memphremagog, Canada. It is somewhat like *M. spicatum* in appearance, but with much more slender stems and shorter leaves; spikes quite slender and only 1 to 1½ inches long; the pistillate floral leaves whorled in threes and fours, pectinate, longer than the flowers, the staminate opposite or alternate, entire or serrate, shorter than the flowers; staminate flowers alternate, the pistillate alternate or in more or less imperfect verticils. Probably this plant occurs in all parts of the lake, and may be looked for within our borders as well as in Canada.

POTAMOGETON PAUCIFLORUS, Pursh, var. NIAGARENSIS, Gray. The writer had the pleasure while on the excursion to Niagara Falls given to the members of the A. A. A. S. at Buffalo last summer, of rediscovering Tuckerman's old species (*P. Niagarensis*, Tuck.), which had not been found since Tuckerman's own collection of it forty years since. Search has often been made for it, but without success, and botanists had nearly concluded that it had disappeared from the original habitat. It seemed to be plentiful in the canal or sluiceway running along the brink of the bank on which the village stands, near the street leading down to Goat Island.

EQUISETUM LITTORALE, Kühlewein. An Equisetum growing on the gravelly shores of Knight's Island, Lake Champlain, has excited a good deal of curiosity and some dispute among botanists who have collected it in situ. By some it is thought to be *E. variegatum*, Sleich., and by others *E. littorale*, Kühl. Specimens of this plant which I collected a year or two ago were sent to Mr. A. Bennett, of Croydon, England, and Dr. G. Tiselius, of Stockholm, Sweden, both of whom have kindly submitted it to good authorities on this family. Mr. Bennett writes that he himself and Mr. W. H. Beebe, who has paid particular attention to this order, regard it as undoubted *E. littorale*, Kühl. Dr. Tiselius informs me that Prof. Th. Fries, Director of the Botanical Gardens at Upsala, and Dr. Sigfr. Almquist, of Stockholm, both pronounce it *E. littorale*, but that they consider that species a hybrid between *E. arvense*, L., and *E. fluviatile*, L. It would seem, therefore, pretty certain that the Knight's Island form, whether the opinion of its hybridity is correct or not, is distinct from *E. variegatum*, and is the plant known as *E. littorale*, Kühl. [An account of the occurrence of *Equisetum littorale* in England, by Mr. Beebe, may be found in the Journal of Botany, vol. xix., p. 54.—ED.]

On the Assimilatory System.

G. Haberlandt, in Ber. d. deutsch. bot. Ges., Vol. IV, pp. 206-236, pl. xi., furnishes a valuable contribution to the elucidation of this interesting subject.

E. Stahl and other authors have advanced the theory that the peculiar shape and position of the palisade-cells are due to the influence of insolation. The chlorophyll grains in the layers of the leaf most exposed to the sunlight are said to have the tendency to avoid the intense light of the perpendicular rays by placing themselves along the side-walls of these cells. They will thus assume a profile position, while the granules in the more protected, deeper layers, in the so-called spongy parenchyma, will occupy the walls parallel to the leaf-surface, thereby presenting their broad side to the incident light. This tendency, according to the authors cited, will cause the palisade-cells to elongate in a direction perpendicular to the leaf-surface, so as to afford the chlorophyll grains ample room to assume the most favorable position. The cells on the spongy parenchyma on the other hand will, for the same reason, expand horizontally. Thus the frequent absence of palisade tissue and the more abundant development of the spongy parenchyma in leaves that have grown in the shade would be explained.

When the solar rays strike the surface of a leaf perpendicularly, the migration of the chlorophyll grains to the side-walls of the palisade-cells, can be easily observed *in some plants.** *Ranunculus Ficaria* is said by Haberlandt to be very good for this purpose. The chlorophyll grains will leave the transverse walls completely in about fifteen minutes. It takes several hours, how ever, for them to return to their former position after insolation has ceased. If a cross-section from a leaf that had been insolated for some time is examined, the chlorophyll grains are found distributed rather uniformly on all the side-walls of the palisade-cells. Then, if the sunlight is directed so as to fall perpendicularly on the long sides of these cells, nearly all the chlorophyll grains will gather on those side-walls which lie in the same plane as the incident rays, *i. e.*, they will assume the profile position; a few grains will pass to the transverse walls.

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*Prothallium of ferns, *Vaucheria* (Stahl), *Ornithogatum nutaus and umbellatum, Muscari racemosum, Scilla bifolia,* etc.

If in all plants, or, at least, in very many, the chlorophyll grains were affected by the solar light in this manner, Stahl's theory would appear highly satisfactory, but the plants mentioned are rare exceptions. Generally the chlorophyll grains do not change their position, but occupy the side-walls of the palisade-cells without being influenced by the intensity or direction of the sunlight. Even the assumption that the chlorophyll grains of the palisade-cells always present their profile to the incident rays is not correct. There are very many plants the leaves of which have large air-spaces under their stomata. These spaces are bordered by palisade-cells that have their lower side-walls curved, frequently even horizontal. Now these horizontal portions of the side-walls are found covered with chlorophyll grains during the most intense insolation, when the granules must necessarily present their broad side to the incident rays. *Scilla bifolia* furnishes a very good illustration.*

Frequently some palisade-cells will be found projecting with their free, upper end into the air-spaces mentioned. In such cells the uppermost transverse wall is often densely covered with chlorophyll grains, although it is parallel to the surface of the leaf. Besides, it must be considered that the rays when passing through the epidermis are doubtless much refracted and dispersed, so that we cannot positively say at what angle they fall upon the chlorophyll grains. We know that in the open air, sun rays never rest on a perpendicular leaf for any considerable time.

If, therefore, for all these reasons, the profile position of the chlorophyll grains in relation to the incident rays cannot be considered as the normal one, it follows that the peculiar expansion of the palisade-cells at right angles with the leaf-surface must not necessarily have been developed simply to afford the chlorophyll grains greater facility in assuming that position.

The author proceeds to show that no chlorophyll grains are found on the walls separating the palisade-cells from the cells of the next lower layer, and that, in this respect, it makes no difference whether these cross-walls are vertical, oblique, or horizontal.

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* I examined *Urginea Scilla* (*S. maritima*) with the same result.

As the current carrying along the products of assimilation,—the carbohydrates—passes through these walls on its way to the conductive parenchyma surrounding the fibro-vascular bundles, it appears, so the author reasons, that the chlorophyll grains avoid those walls, so as not to obstruct that current. Consequently the other walls, *i. e.*, the side-walls, must furnish space for the chlorophyll grains, hence their enlargement in the direction of the current.

In the third and fourth sections of the article the author adds a considerable amount of material against Stahl's (and Pick's) theory. The most important fact he adduces seems to be, that palisade tissue is formed on both sides of leaves growing horizontally, and that some leaves, although they have grown in deep shade, will produce such tissue even on their lower side. This certainly seems to tell against the theory that the development of palisade tissue is dependent on the intensity of insolation.

The last section is devoted to the discussion of the author's own theory, according to which the assimilatory tissue is constructed on a plan that permits the transportation of the products of assimilation the most direct way and in the shortest possible time. The radial arrangement of the chlorophyll-carrying cells in *Cyperus*, several grasses, and *Equisetum* is illustrated and explained, in order to demonstrate that the direction of the current within the cells, not their position relative to the surface of the organ to which they belong, determines their shape and size.

* * *

When I read Haberlandt's paper and wrote an abstract of it for the BULLETIN, the theory advanced in it seemed to me very plausible indeed. But after having carefully examined the leaf of *Urginea Scilla*, both during insolation and after long continued exclusion of light, I find that in many palisade-cells chlorophyll grains are found on the cross-partitions. In fact, I cannot see how the presence of a few granules at those walls could materially obstruct the passage of the sap-current.

I venture to suggest that neither Stahl's nor Haberlandt's theories are necessary to explain the structure of the palisade-cells. It is agreed, I think, that an indispensable factor in the process of assimilation is the atmospheric air. The chlorophyll grains place themselves, with decided preference, along the walls bordering on the intercellular air-spaces* with which the tissues of the leaf are freely interspersed. (In this respect the leaf of *Scilla* is especially instructive; a transverse section parallel to the nerves shows that numerous air-passages are found not only underneath the stomata, but between the contiguous vertical walls of the palisade cells. Even such leaves which, at first sight, seem to have no interstices between their palisade-cells, e. g. *Pilocarpus*, *Actostaphylos* and *Senna*, will be found to contain very narrow, but numerous air-passages along their vertical walls, especially if sections parallel to the leaf-surface be examined).

At the same time each cell of the assimilatory layers feels compelled, as it were, to struggle for its share in the sunlight, the source from which it receives all its energy.

How can we imagine a plan better adapted to fulfil these two conditions, than that on which the palisade tissue is constructed? Into a given volume of this tissue the greatest possible number of cells is packed in such a manner that each presents its upper surface to the incident rays, permitting them to pervade its whole interior, while, at the same time, it furnishes ample accomodation to the chlorophyll grains, on its long walls, where they have the best opportunity to come into contact with the carbonic acid in the air passages. Whether the sun rays strike the profile or the face of the chlorophyll grains is indifferent (as shown by Haberlandt), but whether some grains lie in the path of the sap-current or not, seems to be immaterial also. We shall, of course, most likely not find many chlorophyll grains along the cross-partitions, because there are no air passages adjoining those walls.

That in leaves growing in the shade the palisade-tissue is not developed at all, or not so freely as in leaves exposed to direct sunlight, might simply be explained by the consideration that the force of one of the factors, producing the peculiar growth of the palisade-cells, is considerably diminished. In all organisms the development of such parts is retarded or checked, which, for some reason or other, are prevented from fully performing their functions.

JOS. SCHRENK.

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* Frank in Pringsh. Jahrb. f. Bot., Vol. VIII., p. 299.

New Fossil Deposits of Diatomaceæ.

The diatomaceous deposits of fossil marine forms recently discovered at Szent Peter and Struhar in Hungary, and Brunn in Moravia, have been attracting the attention of diatom students for some time past, on account of the new and rare forms which they contain, but a fossil marine deposit that is likely to prove of still greater interest is that from Oamaru, New Zealand. Messrs. Grove and Sturt have described and figured many of its forms in the last number of the Journal of the Quekett Microscopical Club, and expect to make an exhaustive study of the deposit.

Mr. H. Morland, of Cranford, near Hounslow, England, who furnished the material to Messrs. Grove and Sturt, also kindly furnished the writer with a supply, and gives the following information in regard to the locality: "Oamaru is a town in the middle island of New Zealand, on the East coast, in 45° 8′, South latitude, and 171° East longitude. The material was found in the Cave valley, beneath a series of limestone strata known as the Otatara series, belonging to the Lower Tertiary." Messrs. Grove and Sturt call attention to the curious fact that several of the species in the deposit have only been found previously in the famous deposit on the Cambridge estate, Barbadoes, also that some of the species found in the deposits from Simbirsk, Siberia, and Brunn, Moravia, occur in it with only slight variation. Some of the species found in it are still found living in the Indian Ocean. Over thirty distinct species of *Triceratium* have been discovered in the deposit, and over forty species have been found that have never been described. As the material is imported into England for some industrial purpose, under the erroneous name of *kaolin*, it is probable that diatomists will be able ere long to secure abundant supplies of it. It is rather difficult material to clean, but amply repays for the trouble on account of the beauty and rarity of its forms. To break up the deposit, Mr. Morland recommends the alternate boiling in caustic potash and sulphuric acid, as follows: "Boil first in a strong solution of caustic potash, pour off the disintegrated portion into a beaker glass, and thoroughly wash the undissolved portion, pouring the water into the same beaker. Then boil in sulphuric acid and pour off the portions thus broken up into another beaker, carefully washing as before. Continue the process with the potash and acid solutions alternately until all lumps are broken up. The disintegrated material can then be thoroughly washed and further treated in the usual manner."

Another deposit that is of remarkable interest was struck in sinking an artesian well at Cambridge, Maryland, a few months since. It contains a number of new and strange forms, but the most remarkable is a perfect disc with the raphe and nodules of a *Navicula*. Three species have been observed, two of which have a rim closely resembling that of *Melosira sulcata*. Specimens of *Triceratium*, including the curious *Triceratium Marylandica*, are also pretty abundant. It is to be hoped that some of our American workers will figure the new forms of this deposit and not wait for the work to be done abroad. We hope to have something further to say about it.

C. HENRY KAIN.

Forms of Platanus occidentalis.

I have for many years past pointed out to botanical friends the forms of planes of the character indicated at p. 247, Vol. xiii. The one with the rounder leaves has them also thin, and of a dull green tint. The variety with the more pointed leaves has them also coriaceous and with a shining surface. I find the two forms together over the whole Atlantic slope, so far as I have seen, both in the same localities. Any one can soon learn to distinguish the trees, even when passing them on railroad trains. When we collect the specimens and dry them, it is, however, very difficult to define the difference. I have several times tried to do so with no satisfaction. In regard to variations, gardeners find they can be perpetuated by seeds as well as by cuttings. In this respect, a variation has not the different behavior from a species that at one time was supposed to characterize it.

THOMAS MEEHAN.

Euphrasia officinalis, L.

The note on this plant (Vol. xiii., p. 232) indicates that on the northern Atlantic slope its preferences are for rather dry situations. It may be of interest to add that in my Alaskan collections of 1883, I found the var. *Tatarica*, Benth.—a form growing but one or two inches high—in the glacial regions, in low, swampy, grassy places. THOMAS MEEHAN.

Long Island Plants.

In Mr. Julius A. Bisky's list of plants "not before reported from Long Island," in the January BULLETIN, I notice *Solanum Carolinense*, L., and *Symphytum officinale*, L. The former Dr. Torrey mentions in the State Flora (1843) as growing in "fields on Long Island, near Newtown"; the latter I find in Miller and Young's Catalogue of Suffolk County Plants. In June of last year I found *Myosotis verna*, Nutt; between Greenport and Southold.

FRANK N. TILLINGHAST, Greenport, L. I.

Index to Recent American Botanical Literature.

Æchmea Mexicana, Baker. (Gard. Chron., i., 3d Series, p. 8).

Botanical Necrology for 1886.—Asa Gray. (Am. Journ. Sci., xxxiii., 164, 165.)

Among European botanists of distinction who died during the past year are Edouard Morren, Rev. Wm. W. Newbould, Dr. Wm. Hildebrand, Dr. Henry F. Hance, Prof. T. G. Orphanides, and Prof. J. W. A. Wygand. A notice of Dr. Wygand is published in the Botanical Gazette for January. Prof. Edward Tuckerman is the most notable loss among American botanists.

Carpenteria Californica. (Garden, xxxi., pp. 100, 101, plate 581.)

Another beautiful plate of this showy shrub is here published. In noting the one in the Botanical Magazine (plate 6911), on p. 19 of the BULLETIN, we stated that its native habitat is still uncertain. This statement was based on Sir J. D. Hooker's remark in describing that plate, "it is singular that the exact native country of so fine a shrub as *Carpenteria* should be doubtful." Mr. W. M. Canby has called our attention to the oversight, stating that he possesses specimens collected by Dr. Eisen, labelled "Big Dry Creek, Sierra Nevada, Fresno Co., Cal." The original of the species in the Torrey Herbarium bears no exact locality.

Cercospora, Gleosporium and Cylindrosporium.—Additions to.—J. B. Ellis and B. M. Everhart. (Journ. Mycol., iii., pp. 13-22.)

Fifty new species from various parts of the United States are characterized.

Columbia College Herbaria.—N. L. Britton. (Bot. Gazette, xii., pp. 9-11; reprinted.)

Cultures of Gymnosporangium, with Notes on their Rosteliæ.—Roland Thaxter. (Proc. Amer. Acad. Arts and Sci., pp. 259-269; reprinted.)

Disease of Clover Leaf Weevil (Entomophthora Phytonomi.)—J. C. Arthur. (5th Ann Rep. N. Y. Agric. Exp., Station, p. 291, one figure; reprinted in Report of the Botanist.)

Echinocystis.—The Western Species of.—E. L. Greene. (West. Amer. Sci., iii., pp. 34-35.)

Prof. Greene contends that the cucurbitaceous plants described as species of *Megarrhiza* are not to be generically separated from *Echinocystis*, which would thus consist of seven western species and our eastern *E. lobata.*

Eupatorium ageratoides. (Vick's Ill. Month. Mag., x., p. 56.)

The writer strongly recommends the use of this species for decorative purposes. It is said to bloom a month earlier than the *E. arboreum*, which it much resembles. In places where it blooms in profusion, it is one of the most showy native plants.

Food Plants of Lepidoptera.—Wm. Beutenmueller. (Papilio, v., pp. 53 and 78; reprinted.)

Lists of plants visited by two species of insects are given. *Eacles imperialis* feeds on no less than forty-nine different trees and shrubs.

Forest Trees.—F. J. W. Burnham. (Vick's Ill. Month. Mag., x., pp. 39-41.)

Interdependence of Plants.—Thomas Meehan. (Proc. Acad. Nat. Sci., Phila., 1886, pp. 344, 345.)

Iris.—The Genus.—Asa Gray. (Bot. Gazette, xii., pp. 16, 17.)

Dr. Gray directs attention to Prof. Michael Foster's investigations of *Iris*, and states that he is anxious to obtain seeds and roots of any of the rarer North American species. Any of these sent to the Botanic Garden at Cambridge will be forwarded to

Prof. Foster. We trust that the appeal will not be neglected by our western and southern botanists.

Is Botany a Suitable Study for Young Men?—J. F. A. Adams, M.D. From the first number of the Swiss Cross. (Science, Feb. 4th, 1887.)

Jamaica.—Annual Report on the Public Gardens and Plantations, 1886. 4to., pp. 22.

Juniperus Sabina × communis. A hybrid between these parents is described by Joanne de Csato in Magyar Novénytani Lapok, vol. x., p. 145.

Loco-weeds.—Francis H. Snow. (Science, ix., p. 92.)

In western Kansas the two *loco* plants are *Oxytropis Lamberti*, Pursh., and *Astragalus mollisimus*, Torr.; and it is stated that the horse bot-fly deposits its eggs on the leaves of the latter and thus causes the disease attributed to the plant.

Method for Subjecting Living Protoplasm to the Action of Different Liquids.—G. L. Goodale. (Amer. Journ. Sci., iii., pp. 144, 145.)

New Plants from Northern California.—E. L. Greene. (West. Amer. Sci., iii., pp., 24, 25.)

Ribes Marshallii, *Mitella diversifolia* and *M. ovalis* are described.

Nostoc pruniforme.—Remarks on a variety of.—Geo. B. Twitchell. (Journ. Cinn. Soc. Nat. Hist., ix., pp. 253-255.)

Pear Blight (*Micrococcus amylovorus.*)—J. C. Arthur. (5th Ann. Rep. N. Y. Agric. Exp. Station, 1887, pp. 275-289, four figures; also pp. 300-315; reprinted in Report of the Botanist.)

An account is given of further observations on this pest, and a list of papers published on it is appended.

Petiolar Glands in some Onagraceæ.—Thomas Meehan. (Proc. Phil. Acad. Nat. Sci., 1886, pp. 349, 350 and Bot. Gaz. xii., p. 17.)

Mr. Meehan remarked that stipules were unknown in Onagraceæ but that in *Ludwigia palustris* there are two minute conical glands which may represent them. They were also detected in other species of *Ludwigia* and *Jussiæa*, but in these appear petiolar rather than stipular.

Pharmacognostical Notes.—Jos. Schrenk. (Amer. Druggist, Jan. 1887; reprinted.)

Professor Schrenk finds, contrary to the statements of Berg and of Flückiger, that many specimens of commercial *Taraxacum* root contain distinct pith, the diameter of which in some cases exceeds that of the woody zone; also that the root of *Atropa Belladonna* may contain bast-cells. In discussing the structure of the rootstock of *Veratrum*, he states that the cells in the endodermis of *V. album* are more thickened than in *V. viride*, and the lumena of these cells has the form of a V in *V. album* and of a U in *V. viride;* the rootstocks of the American plant appear to be generally lighter in weight than those of the European, and of a spongy structure. The structure of the endodermis in the rootstock of *Cypripedium pubescens* varies greatly. Professor Schrenk found its cell-walls greatly thickened in plants from a boggy wood, while in those from a dry place they were thin.

Plum Leaf Fungus. (*Septoria Cerasina.*)—J. C. Arthur. (5th Ann. Rep. N. Y. Agric. Exp. Station, pp. 293-298, five figures.)

Stawberry Mildew (*Sphærotheca Castagnei.*) J. C. Arthur. (5th Ann. Rep. N. Y. Agric. Exp. Station, pp. 291-293.)

Submerged Trees of the Columbia River.—C. E. Dutton. (Science, ix., pp. 82-84.)

Trees and Tree Planting in Massachusetts.—C. S. Sargent. (From Ann. Rep. Mass. State Board Agric., 1886, pamphlet, pp. 21.)

Professor Sargent concludes "That the native trees of Massachusetts are better suited to Massachusetts than any exotic trees can be, and that if our woods and plantations are ever to assume real importance, and to make profitable returns upon the money invested in them, they must be composed either wholly or in large part of our native trees."

Vaccinium macrocarpon.—(Garden, xxxi., p. 66.)

The Cranberry is strongly recommended for winter decoration. "Its fruit, when cooked, is said to be very palatable."

Violets, North American.—Memoranda of a Revision of the.—Asa Gray (Proc. A. A. A. S., 1886, pp. 247-253.)

This is, in effect, the same paper published in the Botanical Gazette, Vol. xi., pp. 253-256, and 289-293, and noted in the BULLETIN, xii., p. 21.

Weed Statistics.—J. C. Arthur. (5th Ann. Rep. N. Y. Agric. Exp. Station, pp. 298-300.)

A list of weeds growing on one-twentieth of an acre is given, with their relative numbers in 1885 and 1886.

Botanical Notes.

We have received a circular from Henry Willey, of New Bedford, Mass., offering for sale his collection of Lichens and books. The various works and collections are specified and enumerated. The specimens are mostly mounted or in envelopes, and the New Bedford species are heavily duplicated. The whole is valued at $2,000.

Les Lichens Utiles, par Dr. Felix Henneguy. Octave Doin, Paris, 1883. Octavo, pp. 114; 25 woodcuts.

The author gives us much more than the title would warrant us in expecting. Nearly half the book is devoted to the structure and biology of lichens. Then follow chapters on the chemistry of lichens, the uses to which lichens have been put, and the classification of lichens. The book closes with a detailed description of all species known to be of economic value. Many of the species are figured, and illustrations also appear in the structural part.

The economic part is of necessity chiefly a record of past uses, for very few lichens have held their own against modern substitutes; thus, of those which have been used in medicine, only one *(Cetraria Islandica)* is now officinal, and since the introduction of the aniline dyes, the once highly important tinctorial lichens have almost entirely gone out of use. The production of alcohol from lichen-starch, carried on to a considerable extent in Northern Europe, is one of the most important modern uses that are mentioned.

Not the least interesting portion of the book is the introductory half, and the general reader will find gathered here much valuable information. It must be said, however, that the views expressed regarding the autonomy of lichens are those held by Nylander and the older school of lichenologists, and do not agree with beliefs most widely accepted to-day.

F. LE ROY SARGENT.

Botanical Federation in the West Indies. D. Morris (Nature, xxxv., pp. 248-250). This very interesting account of the efforts which have been made by several of the islands of the West Indies, notably Jamaica and Trinidad, to establish experimental gardens for the culture of various plants of botanical and economical value, is by the former director of the botanic gardens at Jamaica. Much encouragement and assistance has been given by Kew Gardens, and the movement has received a new impetus by the appointment of William Fawcett as Director of the Botanical Department of Jamaica, and of the transfer of John H. Hart to the Botanic Garden of Trinidad. Reports on the forests of Jamaica and St. Vincent have been published, and are valuable additions to the knowledge of West Indian timbers.

The Potato Tercentenary. (Garden, xxx., pp. 535-536. Nature, xxxv., pp. 175-176.) The exhibition was held December 2d–6th, 1886, William Carruthers presiding.

Mr. J. G. Baker, of Kew Gardens, contributed an interesting paper on "The Wild Species of the Potato as at Present Recognized." He stated that there are five distinct species of tuber-bearing *Solanums*, all natives of America, and expressed the wish that some one would undertake to monograph the tuberous *Solanums* in the same way that the genus *Crocus* has recently been monographed by Mr. George Maw.

Mr. Clements B. Markham contributed a valuable paper on "The Cultivation of the Potato by the Incas of Peru and other Andean Nations." It is impossible to do justice to the paper in a short abstract; but he stated that the original home of the Potato was the Cordilleras of the Andes, where it has been cultivated from time immemorial over an area of 3,000 square miles throughout the empire of the Incas of Peru and in Chili. Vocabularies reveal the fact that the ancient people of Bogota cultivated it, and had produced several varieties.

Mr. George Murray, of the British Museum, read a paper on

"The Character and Operation of the Potato Disease," illustrated by diagrams and specimens.

Dr. Masters treated of "The Production of Varieties by Cultivation," and explained the processes.

In the subsequent discussion a number of prominent gardeners took part.

On the Cultivation of the Fresh-Water Algæ. In the Report and Transactions of the Penzance Natural History and Antiquarian Society for 1885-86, Mr. J. Bernard Magor has an interesting paper on this subject. He remarks:—"The statement that the home-growth of Algæ enables their development to be studied carries with it its own justification. In these days the influence of the study of development in biological work of any kind is evident, and the importance of that study is attested by the constant succession of memoirs that are published, dealing with the development of all manner of creatures. Valuable information may be got in three ways from the cultivation of the Algæ: 1. The identification of species not at first noticed in the gathering. 2. The observation of various stages of development, and the elucidation thereby of the successive phases of the life history of a species. 3. The determination of the effects produced on any given species by changes in the conditions of its growth."

The development of *Chætophora pisiformis* is then described. It is stated that all authorities say that it is devoid of bristles, whereas, according to his experience, the young, shooting branches nearly all end in bristles. *Oscillaria princeps* was also studied, and some very curious phases of its growth were noted.

A Method for Retaining the Color of Plants Preserved in Alcohol. (Berichte der Deutschen Botanischen Gesellschaft, iv., No. 8.) Dr. Tschirch has discovered that tannates and coloring matters of plants, with the exception of Xanthophyll, form compounds with lead and barium which are insoluble in alcohol; therefore, he recommends the specimens to be put into solutions of compounds of lead or barium before transferring them to spirit, or simply to add concentrated solutions of acetate or nitrate of lead, or chloride or hydrated oxide of barium to the spirit. The best results have been obtained by plunging the specimens first into boiling water before putting them into the above mentioned mineral solutions.

Anatomy and Physiology of Stinging Hairs. Dr. G. Haberlandt has examined the structure of the stinging hairs in a number of plants. The main features show a great uniformity in the multicellular base surmounted by the very large secreting cell. Below the silicified apex of the latter the cell wall is always very thin. The substance which gives the stinging properties to the fluid of the glands of the common stinging nettle is not, as has been generally supposed, formic acid, which could not produce the effect in such small quantities. Dr. Haberlandt states that the irritation must be produced by a fixed substance, since the dried contents of the gland will cause the ordinary effect of a nettle sting if introduced beneath the skin. He finds always in the fluid a substance which exhibits all the properties of an albuminoid. The substance which produces the inflammation is probably a compound of the nature of an unformed ferment.—(Journ. Roy. Mic. Soc., Dec., 1886.)

Lamarck's Herbarium. The authorities of the Jardin des Plantes have purchased this valuable collection from the University of Rostock, where it was practically inaccessible. The herbarium contains many type specimens which were described in the Encyclopédie Methodique (Nature).

Ramie Fibre. The cultivation of *Boehmeria nivea* was introduced in Spain in 1870, and a company known as the *Compagnie Ramie Française* are separating the fibre at less cost and of better quality than that of hemp or jute. The fabric produced is glossy and resembles pongee silk, and the refuse is used in the manufacture of paper.—(Gardener's Chronicle.)

Transpiration-Stream in cut Branches. (Proc. Cambridge Phil. Soc., V., pp. 330-367.) "Prof. F. Darwin and Mr. R. W. Phillips have repeated Dufour's experiments on the effect on transpiration of two opposite incisions in a branch. They find a general difference in the results between Angiosperms and Gymnosperms, as represented by *Helianthus* and *Taxus*. In the former case transpiration is reduced to a minimum; in the latter case it is not affected to any considerable extent by the opposite incisions. These facts are regarded by the authors as opposed to the imbibition theory, and as explicable only on the hypothesis that the movement takes place in the cell-cavity. In the Coniferæ the water can still move from tracheid to tracheid notwithstanding the incisions; while in Angiosperms, all the vessels being cut, the conduction is rendered difficult."—Jour. Roy. Mic. Soc., Dec., 1886, pp. 1017, 1018.

Note on Sponia micrantha. *Sponia micrantha*, Decaine, is now *Trema micrantha*, B. & H., and under this name is No. 2543* of Curtiss' distribution. These are good flowering specimens, while Dr. Garber's are better for the pistillate flowers, and fruit. WM. M. CANBY.

The Genus Pedicularis in Europe. In recent numbers of the Botanisches Centralblatt, Hans Steininger gives descriptions of all the European species and varieties of this genus at present known.

Proceedings of the Club.

The regular monthly meeting was held Feb. 8th, 1887, the President in the chair and twenty persons present. The following were elected active members:—Miss Elizabeth Jarrett, Rev. L. H. Lighthipe and Mr. E. A. Schultze.

Mr. Geo. E. Briggs, Model School, Trenton, N. J., was elected a corresponding member.

The Librarian distributed the printed list of members of the Club.

Mr. F. J. H. Merrill exhibited and remarked on plants collected in southern Florida and in Collin and Robertson Counties, Texas, in the spring of 1886. Among those collected on Key West, March 10th, were *Sida carpinifolia*, L., *Hypericum fasciculatum*, Lam., var. *aspathaloides*, Chapm., *Ageratum littorale*, Gray, *Ambrosia hispida*, Michx., *Bidens leucantha*, DC., *Tournefortia gnaphaloides*, R. Br., *Solanum Blodgettii*, Chapm., *Salvia serotina*, L., and *Euphorbia trichotoma*, HBK.

At Tampa, Florida, were obtained *Vicia acutifolia*, Ell., *Iris hexagona*, Walt., and *Tillandsia recurvata*, Pursh.

The collections at Calvert, Robertson Co., Texas, included *Ranunculus macranthus*, Scheele, *Anemone decapetala*, L., approaching *A. heterophylla*, Nutt., a variety of *Cerastium nutans*, Raf., a very narrow-leaved form of *Claytonia Virginica*, L., *Castilliea indivisa*, Engelm., *Apogon humilis*, Ell., and *Erigeron tenuis*, T. & G.

Baptisia sphærocarpa, Nutt., *B. leucantha*, T. & G., *Valerianella stenocarpa*, Krok., a small form of *Senecio lobatus*, Pers., *Myosotis verna*, Nutt., *Verbena bipinnatifida*, Nutt., *Scutellaria parvula*, Michx., and a *Gelasine*, perhaps *G. Texana*, Herb., were collected at Leonard, Collin Co., Texas, May 1st.

Professor Schrenk, remarked on Professor Francis Darwin's recent paper on the bloom of leaves and the distribution of the stomata published in Vol. xxii. of the Journal of the Linnæan Society of London. A discussion of stomata and trichomes ensued in which several members participated.

Dr. Britton exhibited specimens of *Lathyrus maritimus*, Bigel., collected by Rev. Mr. Lighthipe at Ocean Beach, N. J.; this appears to be the most southern station known for the plant on the Atlantic Coast. He also showed a large form or variety of *Bidens cernua*, L., from the tidal streams at Red Bank, N. J. Professor Schrenk stated that at the locality near St. Ronan's Well, Long Island, where *L. maritimus* was so abundant, it is about exterminated.

PROCEEDINGS OF THE HISTOLOGIC AND CRYPTOGAMIC SECTION, January 25th.—Professor Schrenk showed a series of leaf-sections of *Scilla maritima* both stained and unstained; also a very interesting longitudinal section of the rhizome of *Aristolochia Serpentaria* showing a dotted duct with a sac-like protrusion of an adjacent parenchyma cell pushed into the duct-cavity and filled with *starch* grains. He also announced the discovery of a fourth kind of glandular hair on the leaves of *tobacco* showing specimens of variable and irregular branching, found especially on young leaves. J. I. Northrup exhibited crystals of calcium oxalate in the petiole of *Hoya* and sclerotic endodermis in *Peperomia argyrea*. N. L. Britton showed stomata on fossil cretaceous leaves from the clay beds at Perth Amboy, and Mrs. Britton prothallia of *Onoclea sensibilis* in different stages.

Bulletin of the Torrey Botanical Club, Plate LXVI.

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7
8
9
10
11
12
13
14
15
16
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Diatoms of Staten Island.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XIV.] New York, April, 1887. [No. 4.

A Descriptive List of Staten Island Diatoms.*

BY E. A. SCHULTZE.

Plate LXVI.

NAVICULA AMPHIRHYNCHUS, Ehr.

Navicula amphirhynchus, Ehr. Amer. 1843, p. 129, t. III., i., fig. 10; Kütz., Bacill., p. 95, t. IV., fig. 13, t. XXI., fig. 11, and t. XXVIII., fig. 47; Rabenh., Süssw. Diat., p. 40, t. VI., fig. 50; Sm., Syn., Vol. I., p. 51, pl. XVI., fig. 142; Ralfs in Prit. Infus., p. 901, pl. XII., fig. 6; Donkin, p. 34, pl. 5, fig. 9; Van Heurck, Syn. Diat. Belg., pl. XIII., fig. 5.

N. producta, Sm., Syn., Vol. i., p. 51, pl. XVII., fig. 144; Ralfs in Prit. Infus., p. 902, pl. VII., fig. 66.

N. affinis, var., Rabenh., E. Diat., p. 196, (var. a *genuina*).

Valve elliptical, with produced capitate extremities; striæ fine, distinct, granular, transverse in the middle, and toward the extremities oblique, reaching to the median line; slightly shortened opposite the central nodule, and interrupted near the margin by one or two longitudinal lines.

Hab.—Fresh water, not frequent. In ponds, Clifton, New Dorp, Huguenot. Plate LXVI., fig. 1. Fossil in the San Fiore, Italy, deposit.

NAVICULA APICULATA, De Bréb.

Navicula apiculata, De Bréb., Diat. of Cherb., p. 16, fig. 5; Ralfs in Prit. Infus., p. 903; Donkin., p. 56., pl. VIII., figs. 6a, 6b.

N. rostellum, Greg., p. 16, pl. i., fig. 20; Sm. Syn., vol. II., p. 93.

Valve oblong, elliptical, produced at the extremities; striæ reaching to the median line, and oblique from the central nodule toward the extremities, somewhat distant.

[* The descriptions of species given in this paper are based upon a comparison of the authorities quoted, a careful elimination of points upon which there is a disagreement, and then a comparison of the amended descriptions with species found in the waters of Staten Island.

The works named are out of print, and most of them are so rare as to be found only in public libraries, hence the descriptions and figures will prove of value to students. C. H. KAIN.]

Hab.—Marine, scarce. In sandy gatherings from South Beach, Prince's Bay and Clifton. (Fig. 2.)

NAVICULA AMPHISBÆNA, Bory.

Navicula amphisbæna, Kütz., Bacill., p. 95, t. III., figs,. 41 and 42: Rabenh., Süssw. Diat., p. 40, t. VI., fig. 66: Sm. Syn., vol. i., p. 51, pl. XVII., fig. 147: Ralfs., in Prit. Infus., p. 899, pl. VII., fig. 72; Donkin, p. 36, pl. V., fig. 13; Van Heurck, pl. XI., fig. 7.

N. ventricosa, Ehr.

Frustulia depressa. Kütz., p. 21, fig. 27.

Valve elliptical, constricted into rounded apices; striæ fine, oblique and shorter at the middle of the valve, producing a lanceolate, median blank space.

Hab.—Fresh water, frequent. In ponds, Clifton, Stapleton, New Dorp, New Brighton. (Fig. 3.)

NAVICULA AFFINIS, Ehr.

Navicula affinis, Rabenh., Süssw. Diat., p. 40, t. VI., fig. 58; Kütz., Bacill., p. 95, t. XXVIII., fig. 65 and t. XXX., figs. 45 and 46; Ralfs in Prit. Infus., p. 902, pl. XII., fig. 32; Sm., Syn., Vol. i., p. 50, pl. XVI., fig. 143: Van Heurck, pl. XIII., figs. 4, 6.

N. ampliata, Ehren.

N. liber, var.

Valve elliptical, slightly constricted toward the extremities; striæ transverse and reaching to the median line, shorter opposite the central nodule and crossed by a longitudinal line near to and parallel with the margin.

Hab.—Fresh water; common. In ponds, Clifton, New Dorp, Huguenot, New Brighton. (Fig. 4.)

NAVICULA INFLATA, Kütz.

Navicula inflata. Kütz., Bacill., p. 99. t. III., fig. 36; Sm., Syn., Vol. i., p. 50. pl. XVII., fig. 158: Rabenh., p. 191: Donkin, p. 21, pl. III., fig. 9: Ralfs in Prit., Infus., 1861, p. 899.

Pinnularia inflata, Rabenh., Süssw. Diats., p. 44, t. V., fig. 10 c.

Valve elliptical, with produced extremities; striæ oblique; frustule small.

Hab.—Fresh water. In ponds, Clifton. (Fig. 5.) Fossil in the San Fiore, Italy deposit.

NAVICULA ASPERA, Ehr.

Stauroptera aspera, Ehr., Rabenh., Sussw. Diat., p. 49, t. IX. fig. 1.,

Frustulia fulva, Bréb.

Stauroneis aspera, Kutz., Bacill. p. 106., t. XXIX., fig. 12.; Ralfs, in Prit. Infus., p. 914; Van H., pl. X., fig. 13.

Stauroptera achnanthes, Rabenh., Sussw. Diats., p. 49., t. IX., fig. 2.

Stauroneis achnanthes, Kutz., Bacill., p. 106, t. XXIX., figs. 20 and 22; Ralfs in Prit. Infus., p. 913.

Stauroneis pulchella, Sm., Syn., Vol. I., p. 61, pl. XIX., fig. 194.; Ralfs in Prit. Infus., p. 914., pl. VII., fig. 77; Donkin, p. 62., pl. X., figs. Ia Ib and Ic.

Valve elliptical–lanceolate with obtuse extremities; striæ oblique and granular, forming a stauros at the central nodule.

Hab.—Marine, not frequent. South Beach, Clifton and Prince's Bay. (Fig. 6.)

NAVICULA BINODIS, Ehr.

Navicula binodis, Ralfs in Prit. Infus., 1861, p. 893; Rab nh., Sussw. Diats., p. 41, t. V., fig. 5; Sm., Syn., Vol. I., p. 53, pl. XVII., fig. 159; Kutz., Bacill., p. 100, t. III. fig. 35; Donkin, p. 38, pl. VI., fig. 3; Van Heurck, Suppl., pl. B., fig. 33.

Valve oblong, constricted opposite the central nodule, and terminating in produced, narrow extremities; striæ indistinct.

Hab.—Fresh water, frequent, not abundant. In ponds, Clifton, New Brighton. (Fig. 7.)

NAVICULA DICEPHALA, Kütz.

Navicula dicephala, Kutz., Bacill., p. 96, pl. 28, fig. 60, 62c.; Sm., Syn., p. 53, pl. XVII., f. 157; Brun, Diat., p. 76., pl. VII., fig. 34; Van Heurck, pl. VIII., figs. 33, 34.

Pinnularia dicephala, Ehr.

Valve linear, constricted toward the rounded extremities; striæ transverse, granular; large central nodule more or less square; median line often double.

Hab.—Fresh water, frequent. In ponds, Clifton, New Brighton and Garretsons. (Fig. 8.)

NAVICULA DIDYMA, Ehr.

Navicula didyma, Kutz., Bacill., p. 100, t. IV., fig. 7., t. XXVIII., fig. 75; Ralfs in Prit., Infus., pl. XV., fig. 12; Donkin, p. 51, pl. VII., figs. 8a and 8b.; Sm., Syn., Vol 1., p. 53; Van Heurck, pl. IX., figs. 5, 6.

Pinnularia didyma, Rabenh., Sussw. Diats., p. 46, pl. VI., fig. 26.

Diploneis didyma, Ehr.

Valve more or less constricted in the centre; extremities broadly oval; striæ granular, transverse, but toward the extremities oblique, less pronounced near the median line.

Hab.—Marine, frequent. South Beach, Clifton, Prince's Bay and salt meadows at New Dorp. (Fig. 9.)

NAVICULA INFLEXA, Greg.

Pinnularia inflexa, Rabenh., Eur., Diats., p. 218.

Navicula inflexa, Ralfs in Prit, Infus., p. 905; Donkin, p. 54, pl. VIII., figs. 2a and 2b.

Frustule small; valve lanceolate, with conspicuous terminal nodules; striæ oblique, connivent, and shorter near the central nodule.

Hab.—Marine, scarce. Prince's Bay. (Fig. 10.)

NAVICULA CUSPIDATA, Kütz.

Navicula cuspidata, Kutz., Bacill., p. 94., t. III., figs. 24 and 37; Sm. Syn., Vol. I., p. 407, pl., XVI., fig. 131; Ralfs in Prit., Infus., p. 905, pl. XII., fig. 5; Rabenh., Sussw Diats., p. 37, t. V., fig. 16; and Europ. Diats., p. 170; Donkin., p. 39., pl. VI., fig. 6; Brun., p. 66, pl. VII., fig. 6; Van Heurck, Syn., pl. 12, fig. 4.

Valve broadly lanceolate, with slightly produced apices; striæ parallel, transverse, very finely dotted and reaching to the median line.

Hab.—Fresh water, common. In ponds, Clifton, New Brighton. (Fig. 11.)

NAVICULA GIBBA, Ehr.

Navicula gibba, Van Heurck, Suppl. pl. A., fig. 12.

Pinnularia gibba, Sm., Syn., Vol. I., p. 58., pl. XIX., fig. 180; Brun., p. 85, pl. VIII., fig. 17.

Pinnularia tabellaria, Sm., Syn., vol. I. p. 58., pl. XIX., fig. 181.

Stauroptera gibba, Ehr., Rab., Sussw., Diat., p. 49., t. IX., fig. 3.

Stauroneis gibba, Kutz., Bacill., p. 107, t. XXIX., fig. 24; Ralfs in Prit. Infus., p. 914.

Valve linear, inflated in the centre and at the extremities; striæ not reaching the median line, costate, oblique.

Hab.—Fresh water, common. In ponds and wayside ditches at Clifton, New Brighton, New Dorp. (Fig. 12.)

NAVICULA HUMEROSA, De Bréb.

Navicula humerosa, Sm., Syn., Vol. II., p. 93; Ralfs in Prit. Infus., p. 903; Rabenh., Europ. Diats., p. 20; Donkin, p. 18., pl. III., fig. 3; Van Heurck, pl. II, fig. 20.

N. quadrata.

N. crassa.

Valve elliptical-linear; extremities truncate; striæ oblique, granular, reaching nearly to the median line, shortened opposite the central nodule, thus forming a blank space.

Hab.—Marine, frequent. South Beach, Clifton, and in the brackish water of the salt meadows at New Dorp. (Fig. 13.)

Mr. Donkin remarks that "this species is very variable in size and outline. In elongated specimens it is frequently constricted in the middle; it is closely allied to *N. latissima* and *N. granulata*, but readily distinguished from them by its very much finer striæ, and by its outline near the extremities, which are much more produced.

NAVICULA ELLIPTICA, Kütz.

Navicula elliptica, Kutz., Bacill., p. 98, t. XXX., fig. 55; Rabenh., Europ. Diats., p. 179; Sm., Syn., Vol II., p. 92; Ralfs in Prit. Infus., p. 899; Van. Heurck, pl. X, fig. 10; Donkin, p. 7, pl. I., fig. 6.

N. ovalis, Sm., Syn., Vol. I., p. 48., pl. XVII., fig. 153.

Valve oval, or linear-elliptical, striæ granular, connivent, separated from the median line on each side by a curved longitudinal line bulging outward at the central nodule.

Hab.—Brackish water, common. Salt meadows at New Dorp. (Fig. 14.)

NAVICULA HITCHCOCKII, Ehr.

Navicula Hitchcockii, Kutz., Bacill., p. 101; Ralfs in Prit., Infus, p. 894, pl. VII., fig. 62; Donkin, p. 29., pl. V., fig 4.

Valve oblong with triundulating margins terminating in cuneate apices; striæ fine and transverse, reaching to the median line.

Hab.—Fresh water, scarce. In ponds, Clifton, New Brighton, (Fig. 15.)

NAVICULA LYRA, Ehr.

Navicula lyra, Kutz., Bacill., p. 94., t. XXVIII., fig. 55; Sm., Syn., Vol. II., p. 93; Greg., D. of the Clyde, p. 13, pl. I., fig. 13; Ralfs in Prit. Infus., p. 897; Rab., Eu. Diat., p. 177; Donkin, p. 14, pl. II., fig 7; Van Heurck, pl. 10, fig. 1.

Valve elliptical-linear; extremities produced and rounded or cuneate; striæ oblique, moniliform, interrupted by two longitudinal unstriated bands branching out from the central nodule toward the extremities in the form of a lyre.

Hab.—Marine, frequent. South Beach, Clifton, Prince's Bay. (Fig. 16.)

NAVICULA IRIDIS, Ehr.

Navicula iridis, Kutz., Bacill., p. 92, t., XXVIII., fig. 42; Ralfs in Prit. Infus., p. 907; Rabenh., Eu., Diat., p. 171; Van Heurck, pl., XIII., fig. 1; Donkin, p. 30, pl. V., fig. 6.

Pinnularia iridis, Rabenh., Sussw., Diat., p. 42, t. VI., fig. 1.

N. firma, Sm., Syn., Vol. I., p. 48, pl. XVI., fig. 138.

Valve linear-oblong, with obtuse extremities; striæ fine, transverse, reaching to the median line, longitudinally crossed near the margin.

Hab.—Fresh water, frequent. Clifton, New Brighton, New Dorp. (Fig. 17.)

Notes on Sanguinaria Canadensis.

Plate LXVII.

In 1884 I published a series of notes on the morphology of a few of our most common species. A part of those on the May apple I found soon after had already been published in an earlier number of the Botanical Gazette, by Prof. Thos. C. Porter. Among the notes then sent were a series on the blood-root. The drawings, however, were accidentally lost by the editor, and the notes returned to me at my request. The present drawings have been made from dried specimens, and this will account in part for their want of elegance.

The blood-root, *Sanguinaria Canadensis*, has a phyllotaxy of the ½ kind. Each year's growth begins with a few scales arranged on alternate sides of the stem; these are followed by a larger and then a smaller leaf, the rest of the axis being transformed into a flower, morphologically speaking. In the axis of the smaller leaf is found the bud which will continue next year's growth; in other words, sympodial growth occurs regularly (Fig. I).

Frequently the axis of the smaller leaf contains a second flower; this shows its nature as a transformed branch, by bearing at the base on one side a small leaf, which subtends the bud for next year's growth (Fig. II). Occasionally this secondary flower-stalk bears at its base even two leaves, the bud being then situated in the axil of the smaller leaf (Fig. III).

The flowering axis may bear a bract half way up to the flower, subtending a second flower-stalk. In this case the scale seems to be opposed to the smaller leaf beneath (Fig. IV). In the most complicated case known, the plant bears three flowers (Plate LXVII, Fig. V). One flower represents the terminal axis, another is in the axis of the smaller leaf. The second flower-stalk has at its base on one side a leaf subtending the leaf bud, and opposed to this, half way up the flowering stalk, is a bud subtending a third flower. At least six specimens showing this method of branching were found by Mr. W. B. Werthner and myself during the course of a day in the spring of 1884.

The sepals (2) may be more or less united on one side, in some cases complete cohesion taking place. There are also cases

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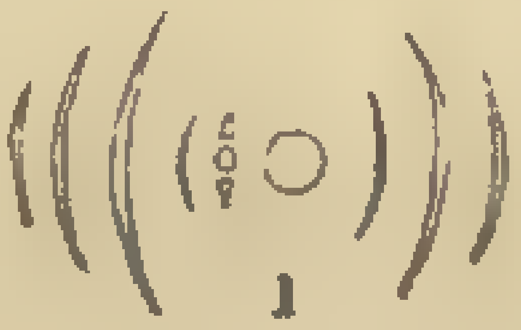
Sanguinaria Canadensis.

in which two sets of sepals of two each are found; the lower set are then half an inch or less distant from the flower, and do not decussate, as might normally be expected. They form an angle of 45 degrees, or even much less, with the upper set.

Eichler, in his Blüthendiagramme, figures the plan of the flowers as though there were two whorls of petals of two petals each. By *dedoublement*, he derives from these two whorls of apparently four petals each. This compels him to locate the sepals *between* the petals of the outer whorl. Observation, however, will show that the sepals are not thus situated, but are beneath two of the petals of the outer whorl. If it be permitted to suggest another plan or arrangement, the following may, perhaps, be nearer the truth: The two sepals may be considered as decussating with two of the petals of the outer whorl; these decussate in turn with the remaining two petals of apparently the same whorl. The two sets of petals considered as a whole then decussate with the inner whorl of petals. This rather anomalous method of arrangement is considered in good taste in other plants, and perhaps will be of equal value here.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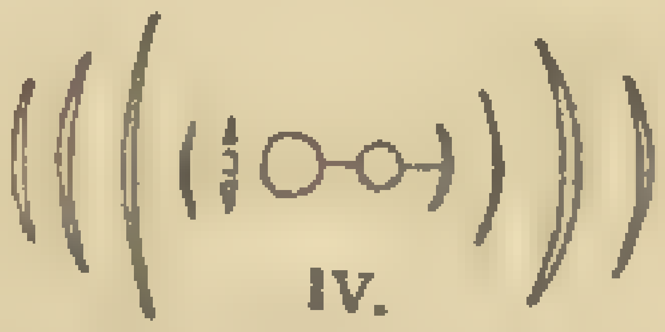
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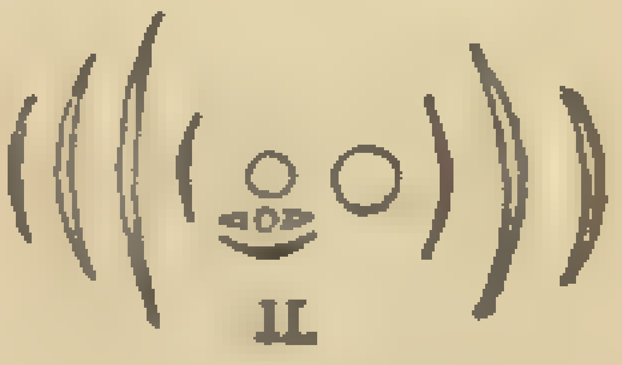
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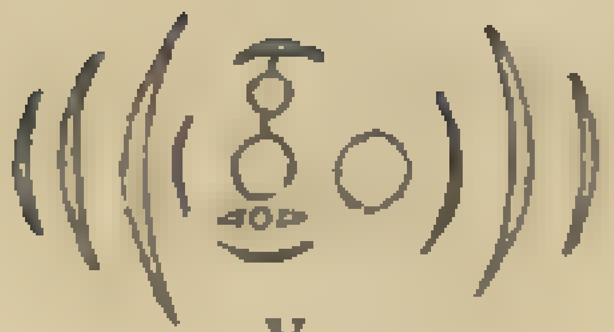
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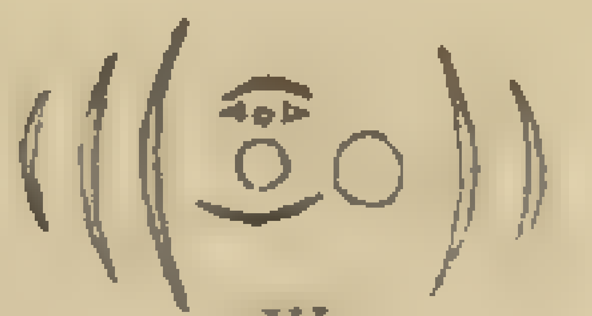
III.

EXPLANATION OF FIGURES.

All figures are represented as having four scales at the base of the plant; these with the bracts above are indicated in the diagrams by double crescentic lines—the leaves by single lines; leaves and bracts of the primary stem in the plate are designated consecutively by Roman numerals, those of the secondary stem by Arabic numerals. The stems are represented by circles, in the diagrams decreasing in size, in the plate lettered consecutively. The buds giving rise to the branch of next year are represented by minute circles between two minute triangles. Flowers borne in the axils of scales on the peduncles of other flowers, are connected with both by dotted lines.

AUGUST F. FOERSTE.

Notes on New Jersey Violets.

Trenton, situated as it is near the borders of the "Yellow Drift," has a particularly rich and varied flora. Not only do we find here the flowers of the middle part of the State, but also a large proportion of those of both north and south Jersey. The genus *Viola* is well represented in this locality, nearly three-fourths of the species and varieties mentioned in Gray's Manual being found within five or six miles of Trenton. *Viola tricolor* is reported from this section, but I have been unable to find it, and have for several years been of the opinion that the var. *arvensis*, which grows here abundantly, must have been mistaken for it. Dr. Gray states in his Revision of N. A. Violets that the pansies are represented in America by *V. tricolor*, var. *arvensis* only, and that hitherto he has taken this for a field variety of *V. tricolor* escaped from cultivation. All my observations tend to confirm the opinion that the variety is indigenous.

I have occasionally found, in the fall, a few specimens of *V. palmata*, var. *cucullata*, Gray, in bloom; but last year, while botanizing near Ramsey's, Bergen County, N. J., I found the flowers quite plentiful, and a few days later was surprised to see the *V. canina*, var. *Muhlenbergii*, Gray, blooming so abundantly that in a short time I gathered a bouquet of the flowers as large as a teacup. The latter species continued to bloom from the time I found it in September to the middle of November. This fact is very interesting, since Dr. Gray says our plant is only spring flowering, and speaks of a summer form of *V. canina* found by Dr. Engelmann near Lake Superior. Whether this was owing to some peculiarity of the season, or whether it is of common occurrence at Ramsey's, I was unable to ascertain; but it is evident that under certain conditions some species of violets, naturally spring-flowering, bloom also freely in the fall; and it seems to me that this occurs frequently enough to warrant its being recorded in botanical works.

WILLARD A. STOWELL.

Starch in Tracheal Ducts.

In *Botanische Zeitung*, No. 10, 1887, Joseph Schrenk speaks of the formation of starch in the ducts of *Aristolochia Serpentaria*, L. Alfred Fisher had reported the occurrence of starch in the ducts of *Plantago major*, L., and had left the fact to be explained by future investigation (Bot. Zeitung, xliii, p. 89).

J. Schrenk noticed that in the rhizoma of *Aristolochia Serpentaria* the interior of the ducts was frequently crowded with those peculiar intrusions from contiguous parenchyma cells, which are known as tylosis. He found an abundance of starch in the intruding portions of these cells, which would satisfactorily account for the presence of starch in dotted ducts; whether this explanation would hold good in regard to *spiral* ducts, the writer of the article is not prepared to decide, as he is not informed of the occurrence of starch in the tylosis cells inside of such vessels.

In a note to the article, Prof. de Bary refers to his book (Vergl. Anatomie, p. 179), from which we learn that Unger (Sitzungsber. d. Wiener Acad., I Abth., 1867) has described tylosis in spiral tracheæ. I seize this opportunity to direct the attention of American students to de Bary's standard work, which, in its English version, opens to us such vast treasures of botanical knowledge.

J. SCHRENK.

Index to Recent American Botanical Literature.

Agarics, North American.—The Subgenus Amanita.—A. P. Morgan. (Journ. Mycol., iii., pp. 25-33.)

Twenty eight species are described, none of them new to science. A key to the species is given.

American Violets. (Garden, xxxi., pp. 168, 169. Plate 584.)

The colors of the plate hardly do justice to the delicacy and brightness of tint of our "Bird-foot Violet," though the writer speaks in highest terms of this and others of our species.

Baptisia calycosa, var. *villosa*, n. var. Wm. M. Canby. (Bot. Gazette, xii., p. 39.)

This new variety is based on Curtis' No. 699, collected in Wilson County, Florida.

Botanical Journals.—C. E. Bessey. (Amer. Nat., xxi., pp. 79-81.)

Catalogue of the known Plants (*Phænogamia and Pteridophyta*) *of Oregon, Washington and Idaho.*—Thos. Howell. (Pamph., 8vo., pp. 28, Arthur, Oregon, 1887.)

A list of 2,152 species and 227 varieties of plants from the northwestern United States, an increase of about 30 per cent. as compared with Mr. Howell's former catalogue, published in 1881.

Celery Leaf Blight. (*Cercospora Apii, Ives.*)—B. T. Galloway. (Bot. Gazette, xii., pp. 66, 67.)

This disease is said to destroy annually about one-half of the celery planted in the vicinity of Columbia, Mo.

Chippeway Plant Names. L. H. Bailey, Jr. (Bot. Gazette, xii., pp. 37–39.)

A list of 54 names of plants used by the Chippeway Indians of northern Minnesota.

Delphinium, an Attempt to distinguish the North American Species of.—Asa Gray. (Bot. Gazette, xii., pp. 49–54)

A tentative arrangement of the species recognized by the author in the section Delphinastrum; 20 of these are given, with five varieties. *D. Parryi, D. Parishii, D. hesperium and D. Nuttallii* are here first described.

Diatoms, Raising them in the Laboratory. Prof. Sam'l Lockwood, Ph.D. (Journ. N. Y. Mic. Soc., pp. 153-166, plates vi. and vii).

Prof. Lockwood is so well known as a careful and conscientious investigator, that this paper possesses a peculiar value, and will doubtless attract unusual attention. It is certainly one of the most valuable contributions to the life-history of the Diatomaceæ ever published. After a series of well conducted experiments he reaches the following conclusions: That diatoms originate in spores so minute that they easily pass through filter paper; that these spores are probably resting spores, not motile, and may lie dormant in total darkness for as great a period as thirteen to sixteen years; that the viability of some genera is greater than that of others; that, owing to the environment being abnormal, development may be rapid and erratic, and that diatoms have embryonal stages or forms with silicate fronds. C. H. K.

Equisetum litorale, Kühl.—W. H. Beeby. (Journ. Bot., xxv., pp. 65, 66; table 273.) "The most noteworthy features about this plant are the abortive spores and the absence of elaters. It is best distinguished from *E. palustre* by the much larger central hollow of the stem, and by the more numerous and shallower furrows; from *E. limosum* by the smaller hollow, by the furrows being deeper and fewer, by its paler color, and conspicuously by the funnel-shaped uppermost sheaths."

Fissidens.—A Revision of the North American Species of.– C. R. Barnes. (Bot. Gaz., xii., pp. 1–8, and 25–32 Reprinted.)

This embodies the results of a winter's work at Cambridge with the Sullivant collection and library, and speaks well for the author's critical discrimination and judgment. He also used the material accumulated by the late Mr. Austin, though no mention of this is made in the paper. It reduces the number of species from 24 in Lesq. & James Manual to 20, by combining those too closely allied and discarding doubtful species, and gives clear descriptions and diagnostic characters for those accepted.

Flora near Santa Barbara, Cal.—Mrs. R. F. Bingham. (Bot. Gaz. xii., pp. 33-35.)

Florida Fungi.—Notes on.—No. 11.—W. W. Calkins. (Journ. Mycol., iii., pp. 33, 34.)

A list of 20 species and varieties of *Polyporus*, collected near Jacksonville.

Florida's new Palm—Chamæphœnix Sargentii.

In the Florida Farmer and Fruit Grower, of Feb. 23, 1887, is an interesting account of this new tree, from the pen of Mr. A. H. Curtiss.

Heuchera and Mitella.—Astringent Qualities of.—F. W. Anderson. (Bot. Gaz., xii., pp. 65, 66.)

History of Garden Vegetables.—E. Lewis Sturtevant. (Amer. Nat., xxi., pp. 49-59.)

Interesting notes are given on the African Valerian (*Valeriana Cornucopiæ*, L.), native to the Mediterranean Region, and furnishing an excellent salad; Alexanders (*Smyrnium olusatrum*, L.); Alkekengi (seven species of *Physalis*); *Barbarea præcox*, R. Br., known as American cress, though a native of the Old World; Angelica (*Angelica Archangelica*, L.), and Anise (*Pimpinella Anisum*, L.)

Lewisia rediviva. (Garden, xxxi., p. 124, plate 582.)

A most delicately colored plate is given of this Western plant.

Lobelia —C. G. Lloyd. (Drugs and Medicines of N. A., ii., pp. 67-98, continued.)

A continuation of the description of the structure and medicinal properties of *L. inflata*, and a beginning of that of *L. syphilitica* is made in this number.

Maple Leaf Scale. (*Rhytisma acerrinum.*)—Samuel Lockwood. (Journ. N. Y. Micros. Soc., ii., pp. 142-144.)

This fungus is described as very destructive to the Maples at Freehold, N. J.

Nuclei.—Fixing and staining.—D. H. Campbell. (Bot. Gaz., xii., p. 40.)

The nuclei experimented on were those of the mother-cells of the spermatozoids of various ferns. They were fixed by 1 per cent. solutions of chromic acid, or by concentrated solutions of picric acid or by corrosive sublimate. Staining was accomplished with hæmatoxylin and gold chloride.

Papaver.—An American.—Mrs. R. F. Bingham. (Bot. Gaz., xii., p. 67.)

The first indigenous species of this genus was discovered by Mr. John Spence in the high mountains of Santa Barbara County, Cal., and been named *P. Californica* by Dr. Gray.

Physiological Botany is the title of the latest of D. Appleton & Co.'s Science Text-books. The volume is an abridgment by Miss E. A. Youmans of Robert Bentley's "Guide to Structural, Morphological and Physiological Botany," in order to make it conform to the rest of the series and supplement the volume, "Descriptive Botany," by Miss Youmans. The illustrations used are the same as those of the original, and were purchased from the author. These are not of uniform excellence, some being very diagrammatic, especially those illustrating the forms of cells, figs. 22-38. After taking a general view of the vegetable world, three chapters (191 pp.) are devoted to the tissues and organs of the Phanerogamia and Cryptogamia, the remaining 88 to the Physiology of Plants. The style is clear and simple, and the typographical work good, so that this will prove a valuable work in those cases where Gray's Series are too difficult and too expensive for class use.

Pinus rigida and *P. Lambertiana* (Garden, xxxi., pp. 128, 152, 156, with figures.)

These may be found in a series of articles on trees and shrubs which are being published by this journal, and will be of much interest and value.

Plants found growing in Meriden, Conn., since issue of Catalogue in 1885.—Mrs. E. B. Kendrick. (Trans. Meriden Sci. Assoc., ii., pp. 54-57.)

Forty-one additional species and varieties are enumerated.

Pollen Tubes of Lobelia.—B. D. Halsted. (Amer. Nat., xxi., pp. 75, 76; ten figures.)

Prof. Halsted found that in all the opened flowers of *Lobelia cardinalis* the pollen within the tube formed by the adnation of the anthers was germinating. The nuclei of the grains was well distinguished by treatment with acid azo-rubin. In the unopened flowers examined, none of the pollen had germinated.

Quercus palustris. (Garden, xxxi., p. 217; 3 figs.)

Schwendener Theory of the Constitution of Lichens.—On the.—F. LeRoy Sargent. (Amer. Month. Micros. Journ., viii., pp. 21-25.)

Staten Island Trees.—On the average size and probable Age of.—Arthur Hollick. (Proc. Nat. Sci. Assoc., Staten Island, Feb. 12, 1887.)

A list is given of a number of the larger native trees of Staten Island, with measurements, and their probable ages estimated from observations by the author on felled individuals and from notes on the same subject published by N. L. Britton in the BULLETIN in May, 1879.

Strasburger's Laboratory.—Douglas H. Campbell. (Bot. Gaz., xii., pp. 35-37.)

Tennessee Flora, with special reference to the Flora of Nashville. August Gattinger. (Pamphlet, 8vo, pp. 109; Nashville, 1887.)

A list of 1,606 species and 102 varieties found by Dr. Gattinger or reported on good authority from the State of Tennessee. Of these, 1,251 have been found within a circle of thirty miles radius from Nashville as a centre. An interesting feature of the work is the comparative tables of plants from calcareous and from silicious soils. There are interesting notes on the three species of *Leavenworthia*, and a description of *Hypericum lobocarpum*, Gattinger; Koehne's arrangement of the Lythraceæ is adopted, a var. *pygmæus* of *Cyperus strigosus* and three varieties of *Panicum capillare*, L., are described, and numerous suggestive notes are scattered through the catalogue.

Tree Trunk and its Branches.—B. F. Hoyt. (Amer. Nat., xxi., pp. 76, 77.)

From four hundred measurements of trunks and of branches just above the crotch, Mr. Hoyt reaches the interesting conclusion that the limbs just above the point of branching contain 11 per cent. more wood than the trunk just below this point. But as the strength is as the cubes of the circumferences, the trunk is stronger than the sum of the limbs by about 13 per cent.

Uncinula flexuosa, Peck, on Leaves of the Horse-chestnut.—J. L. Zabriskie. (Journ. N. Y. Micros. Soc., ii., pp. 144, 145.)

Vermicularia phlogina, n. sp. Charles E. Fairman. Bot. Gazette,, xii., p. 67.)

West Coast Botany.—Analytical Key to. Volney Rattan. (Pamphlet, small 8vo., pp. 128, San Francisco, 1887.)

This work is announced as "preliminary to a West Coast Botany for beginners, which will probably be completed within three years." Concise descriptions of the Polypetalæ except Umbelliferæ, the Gamopetalæ except Compositæ, and the monocotyledonous orders Alismaceæ, Orchidaceæ, Iridaceæ and Liliaceæ. No Apetalæe are given. In his proposed West Coast Botany the author intends to "include some of the Apetalæ and perhaps a tribe of Compositæ." Why not include them all? Our experience with the several incomplete floras of this kind has been far from satisfactory. The amateur finding a common plant, and not being able to identify it by means of his book, is very likely to be discouraged, while the work itself falls into discredit. The area of territory covered by Mr. Rattan's Key is west of the Sierra Nevada and Cascade Mountains, and from San Diego to Puget Sound.

Wild Spring Flowers under Cultivation.. Ernest Volk. (Journ. Trenton Nat. Hist. Soc., i., pp. 46-52.)

Wilmington Flora.—A List of Plants growing about Wilmington, North Carolina, with Dates of Flowering. Thomas F.

Wood and Gerald McCarthy. (Journ. Elisha Mitchell Sci. Soc., 1885-'86, pp. 77-141. Also reprinted, pp. 69, Raleigh, 1887.)

A neatly printed catalogue of 1,168 species and 34 varieties of Phanerogamia and Pteridophyta growing in New Hanover Co., N. C. 1,046 species are regarded as indigenous. A map of the county accompanies the paper.

Woodsia obtusa and Viola palmata — Varities of. Willard A. Stowell. (Journ. Trenton Nat. Hist. Soc., i., pp. 23-26.)

Woodsia obtusa, Torr., var. *Darlingtonii*, is the name proposed by Mr. Stowell for a large form of this fern, the frond nearly tripinnate, the pinnæ distant, lanceolate and acute, the rhachis scarcely or not at all winged, and the sori larger than in the type, from the mountains of Bergen County, near Darlington, N. J.

Variety *variegata* of *Viola palmata*, L., is described with the following characters: "Pubescent; leaves dark green, purplish beneath, reniform cordate to cordate, coarsely crenate; petals curiously streaked and mottled with white and purple; lateral petals densely bearded." Habitat, dry woods, Somerset Co., N. J.

Botanical Notes.

*Pittonia.** The first number of *Pittonia*, to be indexed hereafter, will not fail to excite the liveliest interest in botanical circles. It comes to us without any prospectus, editorial, or introduction of any kind beyond its titular announcement that it is "a series of botanical papers." But it is something more than a series of papers by one of the most accurate of American scholars, it is an appeal by a man who, finding certain of the results of his studies at variance with those of the recognized authorities, calls for a public judgment upon them. It is to be hoped that we shall not follow our usual custom of deciding such questions in the easiest and least responsible way, but will give to this one the attention that its importance demands. As the representative of the leading investigator of our Pacific coast, Pittonia must be welcomed by everyone. It brings to us reliable information concerning a class of facts not elsewhere accessible; for the publications of the

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*PITTONIA. A series of botanical papers by Edward L. Greene, Ass't Professor of Botany in the University of California. No. 1, March, 1887; price, 50 cents.

California Academy are so scanty as to reach only a favored few, and there is no other journal which can bring us just what Pittonia does. Whatever opinion may exist as to the author's interpretation of what he sees, we are not aware that anyone has yet questioned the accuracy of his observations. His well-known advocacy of the importance of field study shows itself very strongly in several places. H. H. R.

Monographie der Gattung Clematis. A monograph of *Clematis* by Dr. Otto Kuntze is published in the Verhandlungen des Botanischen Vereins der Provinz Brandenburg, 1885, pp. 83-202. It is based on specimens collected by the author in his travels around the world, and those in the herbaria and botanic gardens of Berlin, Kew, the British Museum, Leyden, Brussels and Paris. Sixty-six species, about one hundred subspecies and a great number of varieties and subvarieties are recognized. His arrangement of these. so far as it affects North American plants, may be of interest to readers of the BULLETIN.

The genus is primarily divided into two series: (a) Scandentes, the climbing, and (b) Escandentes. *C. dioica*, L., emend., includes all our diœcious or polygamous climbing forms; as subspecies we find *Virginiana*, L., *Dominica*, Lam. (*C. holosericea*, Pursh.) from the Southern States, Mexico and the West Indies, *normalis*, Ktze., credited to Niagara, (?) Mexico, the Antilles and South America, *cordata*, Pursh.,(*C. ligusticifolia*, Nutt.) from Virginia,(?) the Rocky Mountains, California and tropical America, *sericea*, HBK., in which is included *C. ligusticifolia*, var. *Californica*, Watson, as var. *typica* from western North America, Mexico and the Andes, also *Drummondii*. T. and G., and var. *nervata*, Benth., and finally sub. sp. *Catesbyana*, Pursh, with five varieties. Under *C. Viorna*, L., we find as subspecies, *reticulata*, Walt., with four varieties, *normalis*, Ktze, and *coccinea*, Gray. Under *C. Simsii*, Sweet, are *Pitcheri*, T. & G., *normalis*, Ktze., *lobata*, Ktze., and *filifera*, Benth. *C. Viticella*, L. emend., has as subs ecies *crispa*, L., and *Walteri*, Pursh. *C. lasiandra*, Nutt., includes *pauciflora*, Nutt., *normalis*, Ktze., *pseudoligusticifolia*, Ktze., and *fallax*, Ktze. *C. pseudoatragene*, n. sp., is the *C. alpina*, var. *Ochotensis*, Gray, and four subspecies of it are created. *C. alpina*, L., sub. sp. *occidentalis*, Hornem., includes the other American plants of section

Atragene, our *C. verticillaris*, DC., being here referred as a variety with two others. *C. integrifolia*, L., is made to include all our erect and simple-leaved members of the genus; under it we find *ochroleuca*, Ait., with var. *tomentosa*, T. & G., and five sub-varieties of cultivation; *ovata*, Pursh., and *Fremontii*, Watson. *C. Scotii*, Porter, is kept up, as are also *C. Bigelovii*, Torrey, *Baldwinii*, T. & G., and *Douglassii*, Hook., the latter with three subspecies.

The grouping in this remarkable monograph is suggestive, but we do not believe that American botanists will be quick to adopt all Dr. Kuntze's subspecies, varieties and subvarieties. Just what is to be gained by such close classification is not apparent, for nearly every individual specimen examined seems to have yielded a new name. N. L. B.

Food-Grains of India. A. H. Church. This work is more than its name implies, for it includes many plants which are not classed as grains, and many, also, that are cultivated in other countries than India. Thirty-five species are accompanied by full-page illustrations, making an attractive and interesting book.

A new book on Lichens. We are informed by Henry Willey, of New Bedford, Mass., that he has in preparation an Introduction to the Study of Lichens, to be published this spring if sufficient encouragement is given. It will include the collecting and mounting of Lichens, their structure and organs, the distribution and arrangement of North American species, the History of Lichens, with aids to their study. The price will probably not exceed fifty cents.

Notes on Hawaiian Ferns. Lorenzo G. Yates. In a pamphlet of fifteen pages, published at Santa Barbara, Cal., Mr. Yates enumerates the 129 species of ferns known to inhabit the Sandwich Islands, with their habitats and partial synonyms.

The Ferns of Ceylon. Mr. Yates has also published an enumeration of Ceylon Ferns, in a pamphlet of thirty-three pages, with extracts from the manuscript notes of the late Dr. Thwaites and the published works of Hooker, Baker and Wall.

Lejeunea Holtii, a new Hepatic from Killarney, Richard Spruce. (Journ. of Bot., xxv., pp. 33-39 and 72-82; tab. 272.) To all lovers of the mosses and hepatics this will prove to be a most interesting paper, for it gives not merely a description and beautiful plate of a new species, but also discusses the present distribution of the Bryophytes of Europe and America and the means of dispersal in various species. The second part also abounds in most interesting bits of personal experience and generalization. An interesting theory is held to account for the presence of tropical species of Cryptogams at Killarney, that they have survived since Pliocene times; the theory derives additional support from the presence of two molluscs found nowhere else in Europe, *Limnœa involuta* and *Geomalcus maculosus.* "The Killarney Fern," *Hymenophyllum Tunbridgense* is another example that has occurred to us.

Multinucleated cells. (Journ. Roy. Mic. Soc., 1887, p. 107.) "In a number of plants examined, (*Polygonum Sieboldii, Acanthus mollis, Podophyllum peltatum, Eschscholtzia Californica, Impatiens noli-me-tangere, Dictamnus Fraxinella, Linum pyrenaicum, Polygonatum multiflorum*), Mr. A. E. Grant found, on making longitudinal sections of the stem and petioles, that the cells of the wood-fibres contained several nuclei, sometimes as many as ten. These nuclei appeared in general to spring from the division of a single nucleus." (From Trans. Bot. Soc. Edin., xvi., p. 38.)

Sur L'Origine Botanique de quelques Plantes Cultivées et les causes probables de l'extinction des espèces, par M. Alph. De Candolle. (Arch. Sci. Phys, et Nat, Jan. 15, 1887.) After calling attention to the fact that the botanical origin of many cultivated plants is doubtful whereas their geographical source is nearly always certain, M. De Candolle proceeds to discuss the question of the derivation of *Zea Mays, Vicia Faba, Ervum Lens, Cicer arietinum* and *Triticum vulgare*, concluding the paper by indicating the probable cause of the extermination of many of the species which are now known only in the cultivated state, by attributing it to the agency of animals.

On the 6th of January, M. De Candolle reported to the Natural History Soc. of Geneva, that wild plants of *Cucurbita maxima* had been found in Nepaul and seeds sent to Kew. From these M. Naudin has cultivated specimens, at Antibes, the fruits of which M. De Candolle pronounces to be those of *C. maxima.* **(Archives, vol. xvii., p. 75.)**

Proceedings of the Club.

The regular monthly meeting of the Club was held March 8th, the President in the chair and fifty-six persons present. Miss E. V. Clark was elected an active member.

A letter was read from M. G. E. Hylten-Cavallius, director of the Botanical Exchange Club "Linnæa" at Lund, Sweden, asking that the Torrey Club consent to become the agent of "Linnæa" for America. It was unanimously resolved that the request be granted, and the Secretary was requested to communicate with the Director of the Exchange Club.

Mr. E. E. Sterns exhibited specimens of *Bouvardia leiantha*, Benth., with dimorphous flowers, confirming Prof. W. W. Bailey's observations on the plant recorded in the Bulletin, Vol. vi., p. 106, which are cited by Darwin. Also flowering specimens of *Pyxidanthera barbulata*, sold by a New York florist as "Black Forest Heather;" comment was made on the extremely early blossoming of the plant. Also a flowering bush of the poisonous South African "Giftboom," *Akokanthera venenata*, Don, (*Cestrum veneuosum*, Thunb.), of the Apocynaceæ, and remarked on the custom of the natives of boiling the milky juice to a gelatinous substance, with which they tip their arrows.

Mr. E. B. Southwick exhibited specimens of a species of *Heliconia* (probably *H. Bahai*, L.), collected by Mr. P. H. Dudley on the Isthmus of Panama, where it is common and known as "Wild Plantain." Dr. Britton remarked that the abundant starch grains in the stem and leaves are of a large size and oblong in shape. Mr. Southwick showed also beautifully preserved specimens of a number of aquatics grown in the Central Park Terrace Pond in 1886, including eight species and varities of *Nymphæa*, *Limnanthemum nymphæoides*, *Limnocharis Humboldtii* and *Cyperus Papyrus*.

President Newberry remarked on the different plants called "Lotus." *Nymphæa Lotus* formerly grew in the Nile, and parts of it are found in the Egyptian mummy-cases, but it does not now grow in that region. The "Forgetful Lotus" is a species of *Zizyphus*, a native of Northern Africa.

Dr. Britton showed a specimen of *Solidago Missouriensis*, Nutt., collected by himself at Marquette, Mich, and apparently new to the Flora of Michigan; also a specimen of *Cratægus coccinea*, var. *macrantha*, Dudley, collected by Mr. Poggenburg at Fort Montgomery, New York, and flowering specimens of *Tussilago Farfara*, L., collected by Dr. Newberry at Amenia, New York.

Mr. C. F. Cox spoke of the tendency to variation in the genus *Botrychium*, and exhibited five specimens of abnormal *B. ternatum*, var. *lunarioides*, from northern Vermont, comprising (a) two imperfectly developed sterile segments; (b) one fertile and two sterile segments; (c) two large fertile and one sterile segment; (d) one well developed fertile segment with a second, small, fertile one and a sterile segment; (e) one large fertile segment with two smaller fertile and one small sterile segment.

An exhibition of Microscopical Preparations by the members of the Section of Histology and Cryptogamic Botany was then given. The objects shown were as follows:

1. A fungus fruiting in the cell-walls of *Pinus Strobus*, by P. H. Dudley, C.E.

2. Section of a fungus growing in cord-like masses, 8 to 10 feet long, in the Dickinson Iron Mine, N. J. The central portion of these strings is composed of loosely matted hyphæ, enclosed by a harder cortex. By N. L. Britton.

3. Water-pores in the leaves of *Fuchsia* and *Tropæolum*, by Mrs. Winthrop Cowdin.

4. Antheridia, archegonia, operculum, annulus and peristome of species of *Fissidens*, *Funaria* and *Barbula*. Also prothallia of mosses and ferns. Mrs. Britton and Miss Steele.

5. Tyloses in the rootstock of *Aristolochia Serpentaria*, showing protrusions of the parenchyma into a dotted duct, and the protrusions containing starch.

6. Branched glandular hairs of tobacco leaf.

7. Epidermis of *Vanilla*, each cell containing a tabular crystal of calcic oxalate.

8. Mucilage from the leaves of *Nymphæa alba*, containing immense numbers of several species of Bacteria, both *Bacillus* and *Micrococcus* forms. This mucilage appears to be the zoögleal state of these Bacteria. Nos. 5 to 8 by Joseph Schrenk.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XIV.] New York, May, 1887. [No. 5.

Notes on the American Species of Marsilia.

By L. M. Underwood and O. F. Cook.

The accumulation of a large amount of material in public and private herbaria permits a clearer view of the relations of the American species of this genus, and the need of a thorough revision is apparent. While the status of some of our species will depend upon the light given by further collections and the observation of growing forms, it is thought desirable to place on record the results of a preliminary study of the specimens in the two herbaria most extensively consulted. Free access to the collections at Cambridge and at Columbia College has made this study possible, and grateful acknowledgment is here rendered.

The first species of *Marsilia* discovered in America were *M. vestita* and *M. polycarpa*, described by Hooker and Greville in 1831. A. Braun described a third species, *M. uncinata*, in 1839, and a fourth, *M. mucronata*, in Silliman's Journal in 1847. Two other species were described in the same year by Dr. Engelmann, viz., *M. tenuifolia* and *M. macropoda*. In 1857 Feé described *M. picta* from Mexico, and in 1860 Dr. T. F. Allen discovered the European *M. quadrifolia* in Connecticut. *M. Mexicana* was described by A. Braun in 1870, making in all nine nominal species. These comprise all the forms represented in the two herbaria named. Two other species were described by Braun from the West Indies, but so far as we know they are not represented by specimens in any American collection, if indeed they represent valid species. Since 1870 many forms have been collected, notably in the Northwest and Southwest, so that some of the species are represented by very extensive suites.

SYNOPSIS OF SPECIES.

A.—Sporocarps numerous, attached to the stipes in a row by short horizontal peduncles - - - *M. polycarpa.*
Sporocarps on erect or ascending peduncles, arising from the base of the stipe - - - - - - - - *B.*
B.—Sporocarps 2-6 on each peduncle - - - - - - - *C.*
Sporocarps 1 (rarely 2) on each peduncle - - - - *D.*
C.—Plant robust, hairy; sporocarps 2-6; sori, 10 in each valve - - - - - - - - - *M. macropoda.*
Plant more slender, smooth; sporocarps 2-3; sori, 8-9 in each valve - - - - - - - *M. quadrifolia.*
D.—Peduncles 2-4 times the length of the sporocarps; sori, 13-14 in each valve - - - - - *M. uncinata.*
Peduncles shorter, not more than twice the length of the sporocarps; sori, 6-11 in each valve - *M. vestita.*

1.—*M. polycarpa*, Hooker et Greville, Icones Filicum, II., tab. 160 (1831); A. Braun, Monatsberichte der Königl. Akad. der Wissens. zu Berlin, 1863, 417; ibid, 1870, 772.

HAB.—Cuba (Wright, Nos. 1799 and 1800); Jamaica (Arnott)†; Guiana (Arnott)† plant very large; Brazil (Burchell, No. 9488*, Blanchet †).

2.—*M. quadrifolia*, Linnæus, Species Plantarum, Ed. I; Gray's Manual, 5th Ed., 678; Underwood, Our Native Ferns and their Allies, 115.

M. quadrifoliata, Linn., Sp. Plant., Ed. II.; A. Braun, Monatsb., 1863, 418: 1870, 724; 1872, 658.

Plant usually slender, 5-12 cm. high; leaflets variable, 4-14 mm. wide, 5-15 mm. long, margins entire, smooth, or rarely with scattered hairs when young; sporocarps 2 (rarely 3), on a branching peduncle, which is usually attached to the stipe near its base, but sometimes as much as 2 cm. above; young sporocarp with short yellowish-brown hairs, later becoming naked and dark purple; lower tooth obtuse, upper small, acute or obtuse; sori, 8 or 9 in each valve.

HAB.—Bantam Lake, Litchfield Co., Conn., (Dr. T. F. Allen, 1861), from whence it has been cultivated in several localities; Europe; Asia.

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* † References marked with a * are found in the Gray Herbarium; those marked with a † are in the Columbia College Herbarium; those unmarked are in both.

3.—*M. macropoda*, Engelmann, Amer. Journal Science, 2d Series, III., 56, (1847); Underwood, Our Native Ferns and their Allies, 115.

M. macropus, A. Braun, Monatsb., 1863, 418; 1870, 726; 1872, 660.

Plant robust, 10-25 cm. high; leaflets large, 2-5 cm. long, 2 cm. wide or less, usually undulate, clothed with white hairs on both sides when young, becoming smoother with age; sporocarps 2-6, on erect branching peduncles, ascending, densely villose, 6-8 mm. long, 5-6 mm. wide; raphe short, the lower tooth obtuse, the upper inconspicuous or wanting; sori, 10 in each valve.

HAB.—Texas, Rio Grande (Wright, 1848)*, Guadaloupe Co. (Lincecum)*, Ponds on the Seco (Reverchon)†, Austin (Buckley)†, Western Texas (Wright, No. 812)*; New Mexico (Wright, No. 2111).

4.—*M. uncinata*, A. Braun, Flora, 1839, 300; Amer. Jour. Science, 2d Series, III., 55; Monatsb., 1863, 423; 1870, 742; 1872, 665; Chapman, Flora of Southern States, 672; Gray, Manual, 678; Underwood, Our Native Ferns and their Allies, 115.

Plant 6-20 cm. high; leaflets nearly smooth, entire, 10-16 mm. long; sporocarps 6 mm. wide, 8 mm. long; peduncles 15-30 mm. long; raphe long, terminating in two approximate teeth, the upper longer and mostly uncinately curved; sori, 13-14 in each valve.

HAB.—Western Louisiana (Hale); Dallas, Texas (Reverchon, in Curtiss' N. A. Plants, No. 3819).

5.—*M. vestita*, Hooker et Greville, Icones Filicum, II., tab. 159, (1831); Engelmann, Amer. Jour. Science, 2d Series, III., 55; A. Braun, Monatsb., 1863, 424; 1870: 741; 1872, 662; Watson, Botany of California, II., 351; Underwood, Our Native Ferns and their Allies, 115; Coulter, Manual, 437.

M. villosa, Brackenridge, Ferns of U. S. Explor. Exped., 340 (Amer. plant only ?).

M. mucronata, A. Braun, Amer. Jour. Science, 2d Series, III., 55, (1847); Monatsb., 1863, 423; 1870, 740; Underwood, l. c., 115,

M. picta, Feé, Cat. des Foug. du Mexique, 47 (1857).

M. Holtingiana, Schaffner, in Herb. Gray.

M. minima, Fournier ex. Schaffner, in Herb. Underwood.

Plant 3-6 cm. high; leaflets entire or slightly toothed; sporocarps 4-7 mm. long, 3-5 mm. wide; raphe short, lower tooth short and blunt, the upper acute, a little longer, sometimes curved; paleæ varying from soft, dense and spreading to short and appressed, in *mucronata* forms, where it is sometimes wanting; sori, 6-11 in each valve; a very variable species.

HAB.—California (Wilkes' Expl. Exped., 1838-1842)*, Sierra Co. (Lemmon, 1874), San Diego (Orcutt, 1884)*; Nevada, Goose Creek Valley (Watson, 1868, Expl. 40th Par., No. 1372); Oregon (Wilkes' Expl. Exped., 1838-1839)*, (Hall, 1871, No. 697), Multonomah Co. (Howell, 1877)*, (Geyer, No. 450); Washington Ter., Columbia River Valley (Northern Transcont. Survey, No. 1225; Watson, 1880)*, Klikatat Co. (Suksdorf, 1878, 1883)*, Falcon Valley (Suksdorf, 1883, No. 227)*; (Hall and Harbour, 1862, No. 254)*; Montana, Big Blackfoot Valley (Watson, 1880)*; Dakota, Stark Co. (Seiberg, 1884)*; Devil's Lake (Nicollet, 1839)†; Kansas, Ellis (Watson, 1874)*, (E. N. Plank, 1884)*; Arkansas (Nuttall)†; Texas (Lindheimer, 1847, No. 746)*, between Cibols and upper Guadaloupe (Lindheimer, 1847, No. 404)*, Comanche Spring (Lindheimer, 1849)*, Western Texas (Wright, 1849, No. 811), (Drummond, 1870, Ex. Herb. Gay), Dallas (Hall, 1872, No. 861)*, Austin (Hall, 1872, No. 860)*, Dallas (Reverchon, in Curtiss' N. A. Plants, No. 3821); New Mexico (Wright, 1851, No. 2112); Arizona, Stephens' Ranche (Lemmon, 1882, No. 2896); Mexico, San Louis Potosi (Schaffner, 1875-7, distributed as *M. Höltingiana*)*, (also as *M. minuta*, Fournier, in Herb. Underwood); Nicaragua (Wright, North Pacific Expl., Exped. 1856).

Var. TENUIFOLIA (*M. tenuifolia*, Engelmann, Amer. Jour. Science, 2d series, vi., 89, note (1848)*; A. Braun, Monatsb., 1863, 425; 1870, 740; 1872, 664; Underwood, l. c., 114).

Plant somewhat slender, 5-15 cm. high, leaflets narrow (2-4 mm. wide), more or less falcate, the apex often somewhat truncate and unequally toothed, villose with appressed hairs; sporocarps single, 5-8 mm. long, 4-5 mm. wide, the teeth divergent, subequal; sori, 9-11 in each valve.

HAB.—Texas (Wright), Pierdenales (Lindheimer, 1847, No. 745)*.

The above references include a wide range of characters, a few of which seem to call for special notice. Suksdorf's Falcon Valley specimens are by far the finest seen, the stipes being cinnamon-brown, while the paleæ of the sporocarps are long and silky; this form may be regarded as typical of the species. Orcutt's San Diego specimens are very large, approaching *M.*

macropoda in size and general habit. Drummond's Texan specimen is represented by two plants, of which the sterile has the habit of *M. macropoda* and may belong to that species, but the fertile plant is a true *mucronata* form of *M. vestita*. Sterile specimens collected by Lemmon in the Sierra Valley are aquatic, and nearly smooth throughout. Specimens from Kansas, collected by Watson and by E. N. Plank, are very much reduced, being even smaller than Wright's No. 2112, which Braun called var. *minima*.

The distinctions which formerly separated *M. mucronata* can be maintained no longer, since they are sometimes united in the same plants, e. g., on Nicollet's Devil's Lake specimen, which Dr. Torrey originally referred to *M. vestita*, but which Braun placed in *M. mucronata*. Specimens cultivated by Braun (coll. in Texas by E. Hall) and distributed to the Gray Herbarium as *M. uncinata*, do not agree in any particular with his own description of that species, but are certainly his *M. mucronata*.

Reverchon's Texas specimens, distributed as *M. mucronata*, show a tendency to vary toward var. *tenuifolia* in the narrower leaflets, suggesting the inconstancy of that variety.

M. picta, Feé, is an enormous floating form, curiously marked on the under side of the leaflets by radiating ferruginous lines, giving it a unique appearance. Its true relations must be determined by further observation.

In order that some important particulars upon which the classification depends may be more fully established, it is desirable that collectors should pay especial attention to the following points:

(1) In the same species note variations dependent upon station; that is, whether growing in mud, in marshy ground, in somewhat dry soil, in flooded regions or purely aquatic. Judging from the great amount of variation already noted resulting from station and environment, it is certainly desirable to note the extent to which this variation is carried; certain it is, that the hairiness of the sporocarp, which often varies with age, cannot distinguish one species from another, a principle that has not always been considered in descriptive works.

(2) Note specimens of *M. uncinata* in mature fruit and de-

termine the constancy of the characters by which it is separated from *mucronata* forms of *M. vestita*. These are (a) larger number of sori in each valve, (b) greater length of peduncles, (c) uncinate upper tooth of the sporocarp.

(3) Determine the degree of fixity of characters in var. *tenuifolia* of *M. vestita*. No specimens are known to exist except those of Lindheimer and Wright, collected in 1848, and these seem to characterize a well-marked variety. The existence of a somewhat intermediate type in Reverchon's specimens distributed as *M. mucronata*, and the fact that the original form has not been sent in by recent collectors, seem to throw doubt upon the constancy of its characters, as does also the consideration that all the other distinguishing features insensibly grade into *mucronata* forms of *M. vestita*; hence, if it stands, it must stand on the basis of the narrow leaflets alone.

(4) Observe the relations and the cause of the markings on *M. picta*, Feé, from Mexico. It was claimed by the late Dr. Schaffner, who collected *Marsilia* at San Luis Potosi, that *M. picta* was the floating form of his *M. Höltingiana*, which we consider a depauperate form of *M. vestita*. Such a marked degree of variation would not seem to us impossible, as certain floating forms of *M. vestita* are as markedly in contrast with the usual forms of that species, if we except the "pictæ;" and Dr. Schaffner claimed that these were produced by infusoria and larvæ. Indeed, we have observed natant forms of *M. quadrifolia* in Bantam Lake that would present a no less difficult problem to the species-maker, if he were to observe them as herbarium specimens instead of in the field.

New Grasses.

By George Vasey.

Poa rupestris. Culms densely tufted, 6 to 9 inches high, erect and rigid, striate; cauline leaves (2 or 3) very narrow, erect, 1 to 1½ inches long; ligule conspicuous, membranaceous; sheaths smooth, striate; upper part of culm naked; panicle ¾ to 1½ inches long, narrow, and sparsely flowered; branches short, single or in twos below, each with 3 to 5 spikelets, somewhat expanding in bloom; spikelets about three-flowered, 1½ to 2 lines long, empty glumes oblong-ovate, acute, nearly as long as the flowering glumes, which are about 1¼ lines long, oblong, the marginal nerves and base slightly pubescent, otherwise smooth or minutely scabrous. Common in the Rocky Mountains, resembling small forms of *P. cæsia*. Collected by Wolf, Patterson, Letterman and others.

PANICUM HAVARDII. Culms 5 to 6 feet high, stout, leafy; leaves 1 to 2 feet long, thick, rigid, long acuminate, becoming involute, smooth or slightly hairy on the upper side near the ligule, which is a conspicuous ring of short hairs; panicle 1½ feet long, smooth, diffuse, the branches 4 to 7 inches long, singly or in twos or threes, 1 to 2 inches apart, naked for the lower third, above numerously subdivided; spikelets 3 lines long; lowest glume half as long as spikelet, prominently five to seven-nerved, ovate; second glume 3 lines long, prominently nine-nerved, ovate, acuminate; third glume (that of the neutral flower) about equaling the second, five-nerved, its thick palet nearly as long; fourth glume (that of the fertile flower) about one-quarter shorter than the third; styles 2, ciliate tufted at apex.

Found by Dr. Havard in the Guadaloupe Mountains of S. W. Texas, in 1881, and last season in Chihuahua by Mr. C. G. Pringle. I was at first inclined to consider it a variety of *P. virgatum*, but it seems well distinguished by its long, rigid leaves, its smoothness and peculiar gray color, by its conspicuous ligule, and the remarkably large, smooth spikelets.

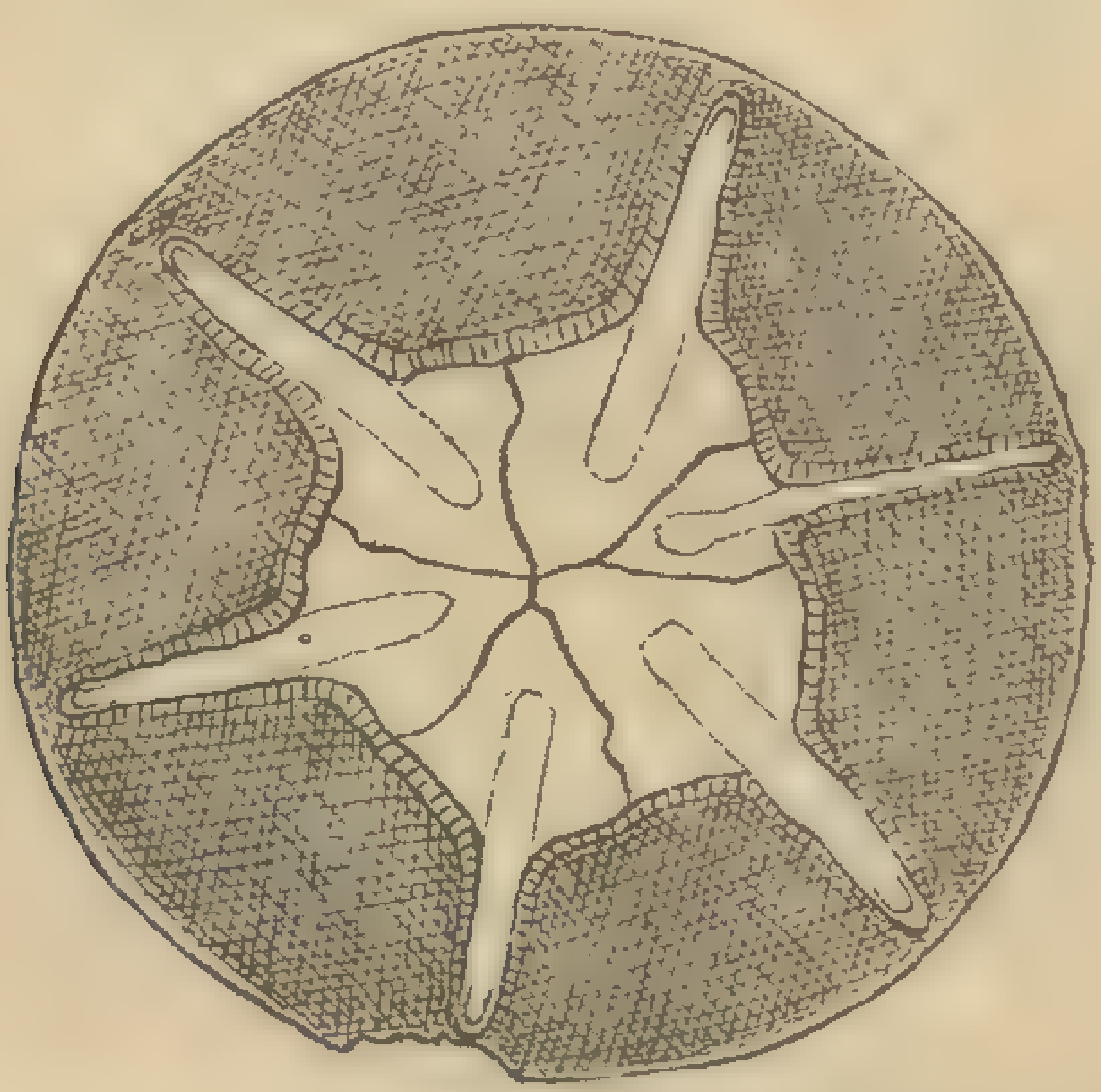
Elongation of the Inflorescence in Liquidambar.

On page 435 of Master's Vegetable Teratology, it is stated that "MM. Clos and De Schönenfeld have recorded the existence of a variety of the Sweet Chestnut, *Castanea*, in which the pistillate catkins were as long and bore nearly as many flowers as the staminate. This is stated to be of constant occurrence in some localities and to be accompanied by a diminished size of the fruits. A similar elongation has been observed in the Walnut, catkins of which have been seen bearing thirty to thirty-five large nuts." We have a similar elongation of the pistillate inflorescence to report in the case of the Sweet Gum, *Liquidambar styraciflua*, found at New Dorp, Staten Island The cluster is over three inches long, with six distinct glomerules below, the lowest of which is pedicelled, the others sessile and merging into the terminal confluent portion.

E. G. BRITTON.

Note on a Variety of Asteromphalus Roperianus Grev.

Asteromphalus Roperianus, Grev., var. Disc circular, compartments areolated, truncate, nearly equal; umbilical lines radiate irregularly from rounded ends of median ones; rays six.



The above described diatom, of which the figure is an exact drawing, was found by me in February of this year, in the original Santa Monica deposit. The specimen varies somewhat from *Aster. Roperianus* as figured by Greville, and later in Schmidt's Atlas, plate 38, fig. 15; having one ray less. Amplification 650 diams. Zeiss 1–18 hom. immersion.

E. A. SCHULTZE.

Note on Abutilon striatum.

I have at hand a specimen of *Abutilon striatum*, in which there are two flowers borne on the peduncle instead of the usual one. From the joint of the peduncle downwards there is indication of two separate axes which have become confluent. If this is so, how did the flowers escape fasciation?

PROVIDENCE, April 7th, 1887. W. W. BAILEY.

A. Hollick, del. ad nat.

Asplenium rhizophyllum, Kunze, var. Biscaynianum, Eaton.

Asplenium rhizophyllum, Kunze, var. Biscaynianum, N. Var.

Plate LXVIII.

Fronds narrowly linear-oblong in outline, a foot or more high, ¾ to 1 inch wide; pinnæ a dozen or more pairs, 8 or 9 lines long, ascending obliquely, the lowest ones scarcely diminished; all but the uppermost pairs cut into about 7 or 8 lobes, of which the lowest superior one is three-lobed, the next one or two two-lobed, and the others simple; all closely placed; upper pinnæ gradually smaller and less deeply lobed; sori usually one on each vein and elongated. This form has the large ultimate segments of the coarser form of the species, from which it differs in the much shorter pinnæ, and consequently in the linear rather than lanceolate outline of the frond. The pinnules an inch or two below the apex scarcely differ from those of *A. dentatum*, with which, and in company with the *myriophyllum* form of *A. rhizophyllum*, it was associated, as is explained below by Mr. Isaac Holden, of Bridgeport, Conn., who discovered it at Biscayne Bay, Florida, 28th of February, 1887. It seems highly probable that it is modified from the type by the influence of its associate.

NEW HAVEN, April 15th, 1887. DANIEL C. EATON.

Notes on some Florida Ferns.

In southern Florida, on the shore of Biscayne Bay, some four or five miles south of the Miami River, under a projecting arch of the coral limestone, is a well, hollowed in the rock to the depth of some five feet or so, with cut steps leading down to the fresh water at the bottom. This ancient excavation, believed by some to antedate the settlement of St. Augustine, is well known in that region as the "Punch Bowl." By going northerly from this point a quarter of a mile, more or less, through the jungle—hummock, or "hammock," as it is there called—keeping near the slope of the rocks, in which procedure a machete is very useful, there is reached a small, comparatively open space in which stands a cocoanut tree of a few years' growth, apparently planted there by accident, and of remarkable beauty. A few rods beyond this tree is a curved recess in the bank of rock which, as I remember it, is at that point some five or six feet in height. On the 28th of February of this year, I found the steep sides of this nook well covered with three kinds of ferns in good fruit, a number of specimens of each of which I gathered and took away. Unfamiliar as I was with southern ferns, I did not doubt that I had three distinct species of Spleenwort, but upon subsequent examination of them, and reference to the books on North American ferns, I found that one of the ferns was not described.

These three ferns, of which there were hundreds growing in close proximity or actual contact one with another, were *Asplenium dentatum*, Linn., *Asplenium myriophyllum*, Presl., and a third form of the same genus, larger than either of the others, possessed of those features common to both, having rather the texture and hue of the *dentatum* and a leaf-pattern approximating to that of the *myriophyllum.* I send herewith a specimen of each of the three kinds.

Now, considering that this fern grows in company with *A. dentatum* and *A. myriophyllum* (I do not recollect having seen it otherwise), that it partakes of their characteristics, and is in most respects almost exactly intermediate between them, that it is of more vigorous growth than either of those nearly related species, and that it belongs to a genus the species of which are strongly suspected of sexual looseness, the question arises whether this is not a hybrid product of the two species mentioned.

It is my intention to have a considerable number of specimens of this fern from the locality above described next season, when the question may receive further consideration. In the few specimens I have, the marks of the immediate form appear to be as definite and unvarying as are those of what are considered good species.

ISAAC HOLDEN.

Special Uses and Properties of some Mexican Grasses.

Dr. Edward Palmer has been engaged in making botanical collections in Mexico during several years past, and has given particular attention to ascertain the uses to which plants are applied. The following notes, gathered from him, respecting the uses and properties of the native grasses are of interest:

Bromus segetum, Schl.—The seeds of this grass are used to assist in the fermentation of a favorite drink called Tejuino, used by the Tarahumares Indians who live in the southwestern part of Chihuahua. The basis of this drink is corn, which is first sprouted, then ground on a stone *metate*, after which water is added and a quantity of the seeds of the *Bromus*. Sugar is also added, and the mixture is then placed by a fire for twelve hours. Fermentation soon sets in. It is not strong at first, but after a day or two it is quite intoxicating. As sold in the markets some looks like yeast, other lots are clear and of the taste of beer. Those not accustomed to drink this corn-beer, will for a time find it quite repulsive to the stomach. It is stated that in some countries other species of *Bromus* are used in making a fermented drink.

Elionurus candidus, Hack., called "soccato colorado," or red-grass, from the color of the roots, which have a strong peppery taste and smell. They are used by the Tarahumares Indians and by Mexicans for curing toothache. The root is chewed and a little put into the hollow of the tooth. It is considered very efficacious, and is kept for sale in the markets.

Stipa viridula, Trin. var.—A tall, coarse grass, collected in Coahuila in 1879, which is considered poisonous to cattle, horses and sheep, having a temporary narcotic effect upon them. It is said that only strange animals will eat the grass, as it is shunned by the native animals who have once experienced its effects.

Epicampes robusta, Fourn.—A coarse grass, growing five or six feet high. It has very straight, reed-like culms, half an inch thick at the base, which, after being stripped of their leaves, are used in making rockets, which are much used at the religious festivals in Guadalajara.

Muhlenbergia and *Aristida*.—Several species of these grasses, growing tall and straight, and with close panicles, are used for making brooms. The leaves are stripped off, and the culms are then tied into bundles three or four feet long and of convenient thickness. These brooms are in general use throughout Mexico. The bundles are sometimes flattened and used in whitewashing.

Andropogon Myosuros, Presl.—This has much the appearance of our *A. scoparius*, but less branched. It grows abundantly on hillsides in bunches. There are many long, straight, wiry culms growing together, and the branches are pulled up and used in thatching the houses of the natives at Rio Blanco.

Cyperus nodosus, Willd.—A kind of rush growing about two feet high, with soft, spongy culms, which are braided together to form a kind of fan called Sopladors, commonly used to fan charcoal fires.

Cathestecum erectum, V. & H.—A low-creeping grass, which is used in decoction to afford relief in painful menstruation. The dried grass is kept in the markets and has a reputation in the treatment of female diseases.

Hilaria cenchroides, H.B.K.—Also a low-creeping grass, but stronger and coarser than the preceding one. It is used in decoction as a popular remedy to purify the blood, especially in the case of skin diseases. Found at Guadalajara.

Sporobolus Indicus, R. Br.—A grass growing in large clumps in rich bottoms. It is called Liendrilla. The culms are straight and firm, and are sometimes twisted into ropes which, however, are not durable. The Indians in emergencies make hats and baskets of it. It is not a good grazing grass except when in a young state.

GEO. VASEY.

Index to Recent American Botanical Literature.

Abies Douglasii. (Garden, xxxi, p. 288, figures.)

American Poppies.

Professor Porter has called our attention to an error on page 80 of the BULLETIN, where *Papaver Californica* is alluded to as the first American representative of the genus. In noting Mrs. Bingham's communication to the Botanical Gazette, we overlooked the well-known *P. nudicaule*, L., of Arctic America and the Rocky Mountain region—as did Mrs. Bingham.

Asperfoliæ—Some West American.—E. L. Greene. (Pittonia, i., pp. 8-23.)

Professor Greene contends that the ordinal name Asperfoliæ is older than Borraginæ and should be adopted. He proposes *Allocarya*, n. gen., for some of the plants referred to (*Eritrichium* and *Krynitzia*) by Dr. Gray, and describes seven new species. Under *Plagiobothrys*, Fisch. and Meyer, he places the *Echidiocarya Arizonica*, Gray, as *P. Pringlei*, *P. microcarpa*, n. sp., and a new variety of *P. canescens*, Gray. *Sonnea*, n.

gen., includes four of Dr. Gray's species of *Plagiothrys*, and a new one, *S. Harknessii.*

Biologia Centrali Americana.—Botany, Part xxii.—By W. B. Hemsley.

This part was issued in March. The work is approaching completion, the present pages containing supplemental matter in Compositæ and the following; an enumeration of a collection of plants made on Cozumel Island off the coast of Yucatan, by F. Gaumer in 1885, in which several new species are described; a list of plants from several islands off the coasts of Yucatan and Honduras made by Mr. Gaumer in 1886, and a list of Costa Rica ferns. The appendix contains a valuable sketch of the history of the botanical exploration of Mexico and Central America.

Botanical Contributions, 1887.—Asa Gray. (Proc. Amer. Acad. Arts and Sci., xxii., pp. 270–314.)

I.—A Revision of some Polypetalous Genera and Orders. Under Papaveraceæ Dr. Gray offers an arrangement of *Eschscholtzia*, recognizing nine species and one variety. In *Portulacaceæ* nine genera are adopted, it being contended that *Spraguea* and *Calyptridium* are distinct, in opposition to the views of Professor Greene. Of *Portulaca*, Dr. Gray adopts four terete-leaved species, *P. parvula* here first described. *Calandrinia sesuvioides*, n. sp., is the *Claytonia ambigua*, Watson. A rearrangement of *Claytonia* is given in which *C. cordifolia* and *C. Nevadensis* of Watson are included in *C. asarifolia*, Bongard; *C. Sibirica*, L., var. *heterophylla*, n. var., is the *C. alsinoides*, var. *heterophylla*, T. & G., and *C. bulbifera*, Gray, is reduced to var. *bulbillifera*, n. var., of the same species; *C. spathulata*, Dougl., var. *tenuifolia*, n. var., is *C. tenuifolia* and *C. exigua*, T. & G.; *C. Hallii*, n. sp., is the *C. Chamissonis*, var. *tenerrima*, Gray. *Spraguea*, Torr., is regarded as of but a single species. *Calyptridium Parryi* is a new species from Bear Valley, California. In *Malvaceæ* we find critical revisions of all our larger genera, *Sidalcea pedata*, *Spheralcea Coulteri*, (the *Malvastrum Coulteri* of Watson), *S. ambigua*, (the *S. Emoryi*, Torr. in part), *S. Rusbyi*, *Sida Neo-Mexicana* and *S. Xanti*, *Anoda Arizonica*, *A. Thurberi*, *A. abutiloides* and *Abutilon Xanti* are new species. *Horsfordia* is a new genus between *Spheralcea* and *Abutilon* consisting of *H. alata*, (*Sida alata*, Watson), and *H. Newberryi* (*Abutilon Newberryi*, Watson.) *Hibiscus lusiocarpus*, Cav., is the oldest name for *H. incanus*, Schrad. & Wendl., and *H. grandiflorus*, Michx.; its variety *occidentalis*, n. var., is the *H. Moscheutos*, (?) var. *occidentalis*, Torrey.

A new order, *Cheiranthodendreæ* contains the genera *Cheiranthodendron*, Larreat, and *Fremontia*, Torrey. Three species of *Tilia*, *T. Americana*, L., *T. pubescens*, Ait. and its var. *leptophylla*, Vent., and *T. heterophylla*, Vent. are recognized, and Dr. Gray thinks that *T. Mexicana*, Schlecht, is also a good species.

II.—*Sertum Chihuahuense*: appendix, contains descriptions of six new Gamopetalæ from Mr. Pringle's Mexican collection in 1886.

III.—*Miscellanea*. *Anemone Oregana*, *Viola Howellii*, *Pentachæta Orcuttii*, *Gentiana linearis*, Frœl., var. *latifolia*, *Frasera Cusickii*, *Phlox dolichantha*, *Phacelia hirtuosa*, *Lycium Shockleyi*, *Castilleia Suksdorfii* and *Galvesia juncea* (*Antirrhinum junceum*, Gray), are here characterized.

Defoliation.—Illustrated by a Longitudinal Section through the Stem and Base of Petiole of the Virginian Creeper, Ampelopsis hederacea. (Cole's Studies in Microscopical Science, vol. iv., Sect., 1., pp. 29-31; plate 8.)

Diatom—The Life of a.—Samuel Lockwood. (Journ. N. Y. Micros. Soc., ii., pp. 135-142.)

Drosera rotundifolia.—Chas. E. Briggs. (Nat. Comp., ii., pp. 68, 69.)

Echinocystis, section Megarrhiza.—Edward Lee Greene. (Pittonia, i., pp. 1-4.)

This is in effect the same paper published in the West American Scientist, Vol. III. pp. 34-35, and noted in the BULLETIN, this volume, p. 60.

Eschscholtzia glauca, n. sp.—E. L. Greene. (Pittonia, i., p. 45.)

In reviewing Dr. Gray's treatment of this genus in Proc. Amer. Acad., xxii., pp. 271-273, Professor Greene describes this new species, one of the perennial group, and remarks that there is probably still another one in the interior of California—perhaps the *E. crocea*, Benth.

Flora Ottawaensis—Additions, 1885. (Trans. Ottawa Field Nat. Club, ii., p. 363.)

Nineteen species of Phanerogamia, additional to those recorded in previous lists, are enumerated.

Florida Fungi—Notes on, No. 12.—W. W. Calkins. (Journ. Mycol., iii., p. 46)

Fungi—New Species of.—J. B. Ellis and B. M. Everhart. (Journ. Mycol., iii., pp. 41-45.

Nineteen new species are described.

Fungi—The Use of English Names for.—C. E. Bessey. (Amer. Nat., xxi., pp. 264, 265.)

Professor Bessey warmly advocates the use of English names for the Fungi, at least those which are familiar as pests.

Apropos of popular names, a funny review may be found in the Journal of Botany (xxv., pp. 120-121) of a "Text-book of British Fungi," by W. D. Hay, the index being given in popular names which recall "those of some of Dickens' characters, if the following may be taken as examples: Wrinkletwig, Jellysprout, Thimblefinger, and Rootingshank."

Grasses of North America, for Farmers and Students.—W. J. Beal, Michigan Agr. College, Vol. 1.

This is the most extensive work on Grasses that has been undertaken in this country. The first volume is an 8vo of 457 pages, divided into 17 chapters. The first chapter is one of 40 pages, on the structure, form and development of grasses, giving minute details of the roots, culms, leaves, sheaths, bracts, flowers, etc., with many illustrations to show the tissues and microscopic structure. Then follow three chapters on the power of motion in leaves, on plant growth and composition, on plant affinity, on the botanical characters of the order Gramineæ, its economic importance, and directions for collecting, studying and preserving grasses. These chapters will mainly be of interest to the special student.

Then follows a chapter on "Native Grazing Lands," comprising sketches of the grass vegetation of the native prairies and pastures of the west and southwest, including parts of Mexico. These five chapters form the first hundred pages of the work.

The next hundred are given to an account of the commoner grasses of agriculture, their adaptation to different localities, and the views of various agriculturists as to their respective values for pastures and meadows. The book is almost exhaustive in its treatment of the subject.

The typographical appearance of the work is very good The illustrations vary considerably in character, some being well executed, while a few appear coarse and poorly finished.

We are informed that the second volume is in preparation, and that it will contain descriptions "of all known grasses of North America, 700 or more species, (if all North America be included the number of species will probably be twice as many) with illustrations of one species in each genus, and in some cases more than one." Its appearance will be looked for with great interest by botanists in general and by students of grasses particularly. GEO. VASEY.

Hazardia—A new Genus of Asteroid Compositæ.—Edward Lee Greene. (Pittonia, i., pp. 28-30.)

This new genus is based on two plants formerly described by Professor Greene, under *Corethrogyne*, and a new species, *H. serrata*, from the island of Santa Cruz.

Heuchera sanguinea, Engelm.—J. D. Hooker. (Curtis' Bot. Mag., xliii.. Tab. 6,929.)

Le Phallus et la Morille. (Le Nat. Canad., xvi., p. 96.)

Mosses collected in the Neighborhood of Ottawa.—John Macoun. (Trans. Ottawa Field Nat. Club, ii., pp. 364-372.)

An enumeration of 123 species, 3 of them Sphagnums, and 43 Hypnums, with localities and dates of collection.

Mycologic Flora of the Miami Valley, Ohio.—A. P. Morgan. (Journ. Cincin. Soc. Nat. Hist., x., pp. 7-18; continued.

New Species, mainly Californian.—Edward Lee Greene. (Pittonia, i., pp. 30-40.)

Cardamine filifolia, Ribes Marshallii, Mitella diversifolia, M. ovalis, Godetia micropetala, Astragalus Miguelensis, A. leucopsis, T. and G. var. *brachypus, Galium flaccidum, G. Miguelense, Calais plurisetà, Arctostaphylos myrtifolia*, Parry, *Phacelia scabrella, Diplacus parviflorus, Eunanus Austinæ, E. Cusickii*, (*Mimulus Bigelovii*, var. *ovatus*, Gray), *E. subsecundus* (*M. subsecundus*, Gray). *Mimulus arvensis*, *Castilleia hololeuca*, *Sphacele fragrans*, *Eriogonum grande*, *E. rubescens*, *E. tripodum*, *Atriplex nodosa* and *Quercus parvula* are here described.

Septorias of North America—Enumeration and Description of the.—George Martin. (Journ. Mycol., iii., pp. 37-41.)

Sumacs.—Warren H. Manning. (Vick's Ill. Month. Mag., x., pp. 101-103; four figures.)

An interesting account on the habits and uses of the various species of *Rhus*. Figures of *R. glabra*, *R. venenata*, *R. aromatica* and *R. Toxicodendron* are given.

Sympetaleia.—Asa Gray. (Amer. Journ. Sci., xxxiii., pp. 319, 320.)

Dr. Gray notes that Professor Baillon's new genus *Lasella*, published in a recent number of the Bulletin of the Linnæan Society of Paris, has just the characters of *Sympetaleia aurea*, Gray, from Lower California.

Tomato—The Origin of, from a morphological standpoint.—L. H. Bailey, Jr. (The Am. Garden, April, 1887, pp. 116, twelve figures.)

The author concludes that "most of the large varieties of tomatoes give unmistakable evidence of development from the cherry tomato, which has regularly a two-celled fruit."

Trifolium—Some West American Species of.—Edward Lee Greene. (Pittonia, i., pp. 4-6.)

Critical notes on nine species are given, among them *T. olivaceum*, *T. columbinum*, *T. triflorum*, *T. Rusbyi*, *T. exile*, and *T. laciniatum*, sp. nn.

Von Schweinitz—Lewis David. (Journ. Elisha Mitchell Sci. Soc., 1885-'86, pp. 9-24, with portrait.)

A very interesting biographical sketch of this eminent naturalist, based on a paper by Mr. Walter R. Johnson, published by the Academy of Natural Sciences of Philadelphia, in 1835.

Zauschneria—The Species of.—Edward Lee Greene. (Pittonia, i., pp. 23-28.)

Five species are recognized, three of them here first described.

Botanical Notes.

We have received the following circular from J. Donnell Smith, which is worthy of interest, especially as the collection will be named at Berlin by most eminent authorities.

Baron Eggers has been engaged by the undersigned, and under the patronage of the Royal Academy of Sciences of Berlin, to undertake a journey of botanical research in the higher mountain regions of San Domingo that have not yet been explored. The plants to be collected will be distributed in two series with corresponding numbers. The first series will embrace such plants as have not already been distributed in Eggers' *Flora Indiæ Occidentalis Exsicc.*, and will cost forty (40) marks per hundred. The second and larger series will omit only the ubiquitous tropical species, especially those of the sea-coast, and will cost thirty (30) marks per hundred. The determinations will be elaborated by the undersigned, assisted by various monographers. He will be pleased to receive subscriptions to either series, but without prepayment In view of the difficulties of transportation on the Island, only a limited number of sets will be collected, and a prompt notification is requested from those who wish to subscribe.

DR. IGN. URBAN.

FRIEDENAU BEI BERLIN, GERMANY.

The Summer School of Botany of Harvard University will be held at Cambridge, Mass., July 6th to August 6th, 1887, and will include laboratory work in morphology and cryptogamic botany under the direction of Mr. J. E. Humphrey, and lectures by Prof. Goodale four times a week. Application should be made to Mr. Humphrey, 6 Divinity Hall.

Professor Joseph Schrenk announces two series of classes in Botany at the *College of Pharmacy.* An afternoon class in Structural and Systematic Botany, beginning Wednesday, April 6th, and an evening class in histology and physiology of plants, beginning April 7th and ending June 30th. Tickets may be obtained at the College, 209 East 23d Street, New York.

The new Index of Plant Names. In the Journal of Botany for March, 1887, Mr. B. Daydon Jackson gives a very interesting account of the progress of the work of preparing this much needed index, which is based on Bentham and Hooker's Genera Plantarum.

It was begun five years ago, shortly after the death of Charles Darwin, who bequeathed a sum for the purpose of supplying a want which he had long felt.

Die naturlichen Pflanzenfamilien nebst ihren Gattungen und wichtigeren Arten. The first part of this valuable publication is written by O. Drude and devoted to the palms. It is fully and handsomely illustrated. Much space is given to the description of anatomy and morphology, and in the systematic portion we find much useful information regarding the economic products of these plants. The past history of each genus of which fossil representations have been found is given. The work is edited by Professors Engler and Prantl, and published at a remarkably low price by Engelmann, in Leipzig.

Proceedings of the Club.

The regular monthly meeting was held at Columbia College, on April 12th, twenty-two persons present, the Vice-President in the Chair.

Hon. J. D. Cox, of Cincinnati, Ohio; Romaine B. Hough, of Lowville, N. Y.; Rev. R. D. Nevins, of Olympia, Washington, and Professor H. L. Smith, of Geneva, N. Y., were elected Corresponding Members.

The following members were appointed to act as a Field Committee for the season:—J. F. Poggenburg, Miss Alice B. Rich and N. L. Britton.

Attention was called to the proposed meeting of the American Association for the Advancement of Science in N. Y., Aug. 10th, and the President was requested to appoint a committee to represent the Club at the meeting of delegates from the several societies of the city and vicinity to be held on April 29th. The President appointed Judge Addison Brown, Dr. T. F. Allen, Mr. F. J. H. Merrill, Mrs. N. L. Britton and Miss Winifred Edgerton, Ph.D., such committee.

Mrs. Britton read a communication from Dr. Thos. F. Wood, of Wilmington, N. C., stating that the *Pyxidanthera* shown at the last meeting had been collected in the vicinity of that city.

Mr. Sterns reported his observation of three fold trichotomy in a tendril of *Bignonia capreolata*, L., which had three main branches, each with three secondary branches, one of the latter having three distinct tertiary branchlets tipped with small disks resembling those of *Ampelopsis*. He also remarked on an apparent order in the arrangement of the prickles of *Rosa Sinica*, the Cherokee Rose, there being three to each internode, a pair of them sub-opposite and just below the node and nearly at right angles to the petiole, and the other considerably lower down and in a line with it.

Mr. J. I. Northrop showed a specimen of *Polypodium incanum* from Florida, where it is known as the "*Resurrection Fern*," from its habit of curling up when dry and expanding when wet.

Miss Steele showed a specimen of *Richardia* having two spathes, one below the other, sent by Dr. O. R. Willis.

Professor Schrenk showed specimens of a fungus found growing under the bark of a dead tree, apparently *Rhizomorpha subcorticalis*, and remarked on its resemblance to those shown at the last meeting from the Dickerson Iron Mine, N. J.

Mrs. Britton showed a specimen of the fruit of *Liquidambar* illustrating elongation of the inflorescence.

Dr. Britton read a communication from Rev. Dr. J. E. Peters, of Mays Landing, N. J., accompanying a specimen of *Phoradendron flavescens* collected in the neighborhood of that place. It is there found exclusively on *Nyssa multiflora*. He remarked that thin sections of the branches revealed the presence of chlorophyll in the pith and showed microscope preparations to illustrate this fact. He also exhibited a curious specimen of wood from the collection of the late Professor Holmes of Charleston, S. C.; it is nearly a foot in diameter, hollow, and of a peculiar plumose structure. It was found at the base of a tree near Charleston, and appears from microscopical examination to be of the Bald Cypress (*Taxodium distichum.*)

The paper announced for the evening, "Notes on a Collection of Texas Plants," by H. H. Rusby and N. L. Britton, was then read. It will be published hereafter.

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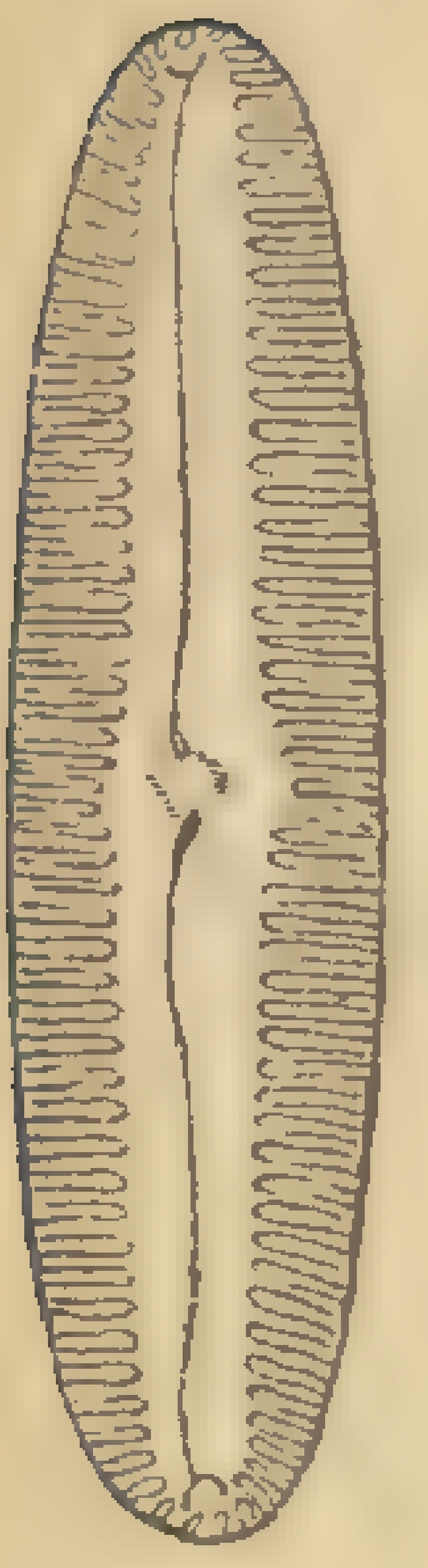

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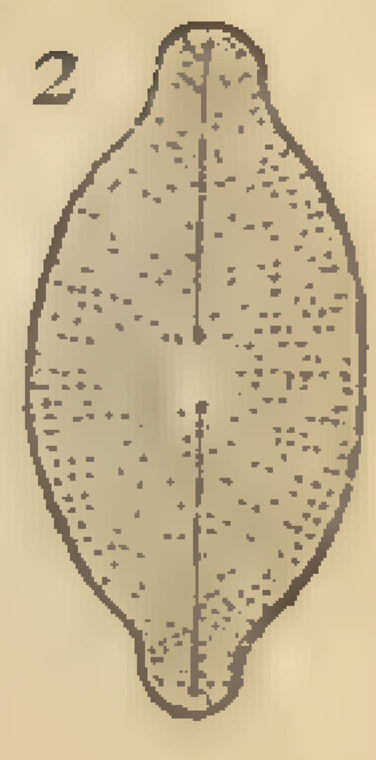

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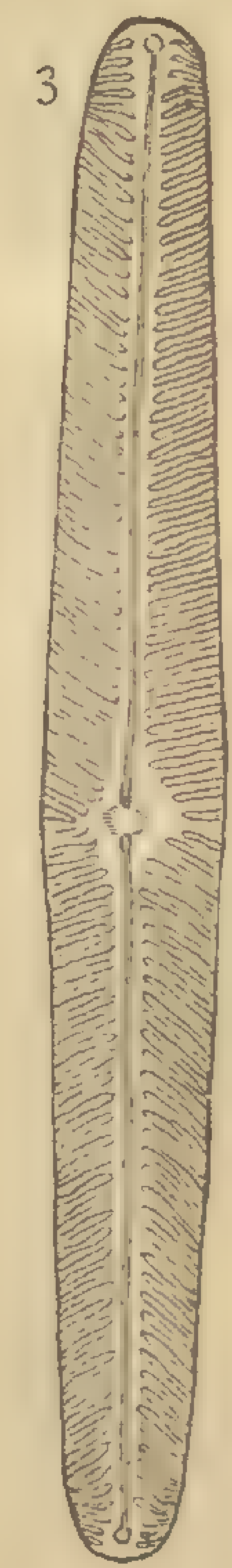

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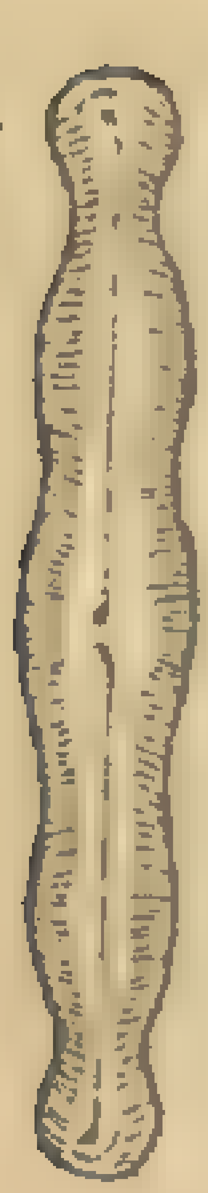

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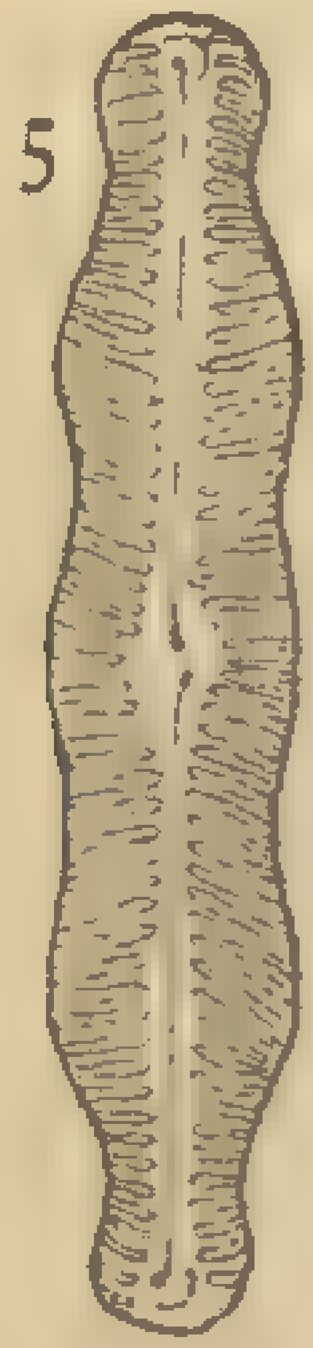

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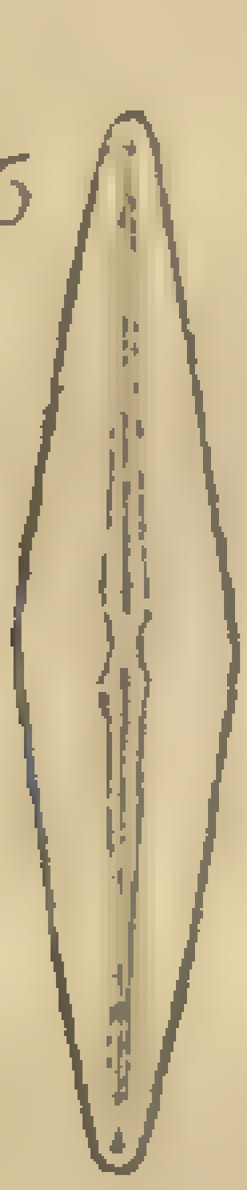

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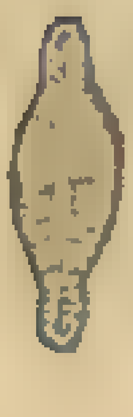

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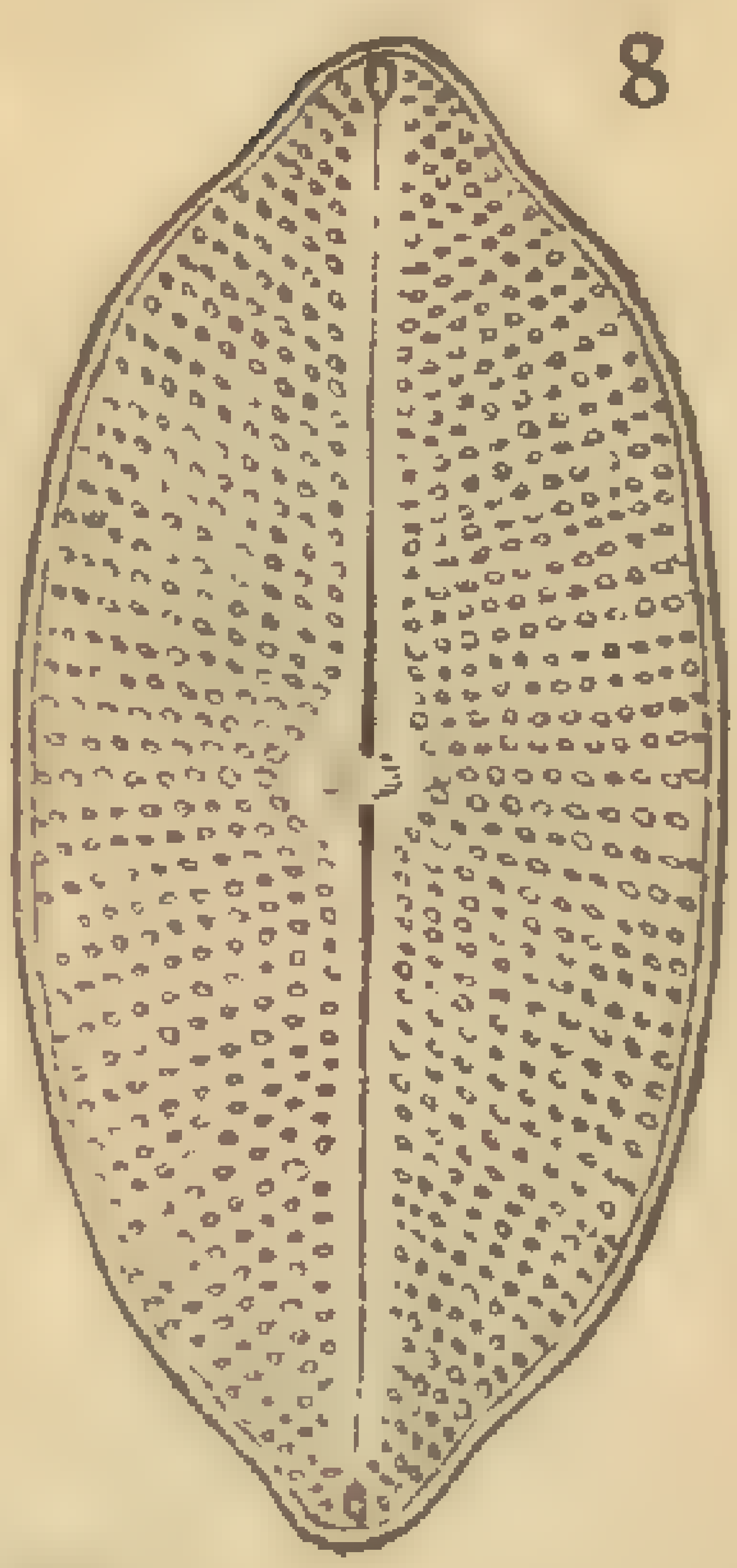

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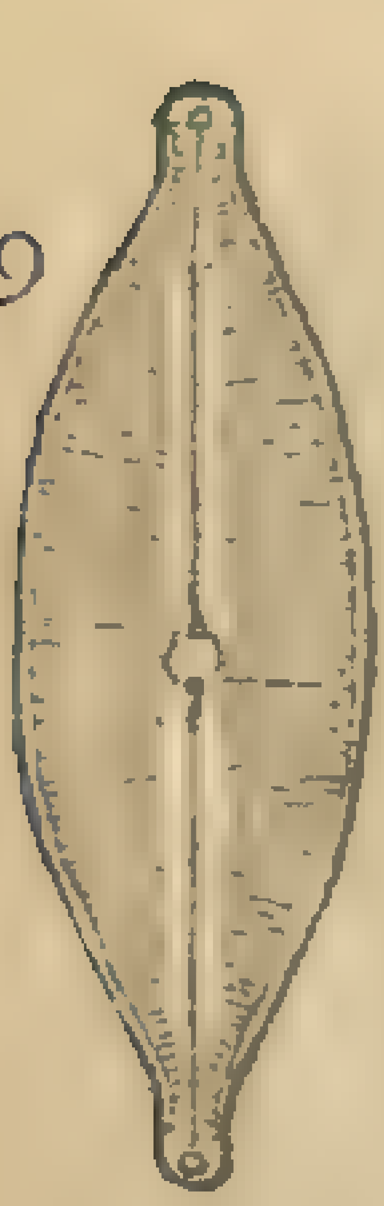

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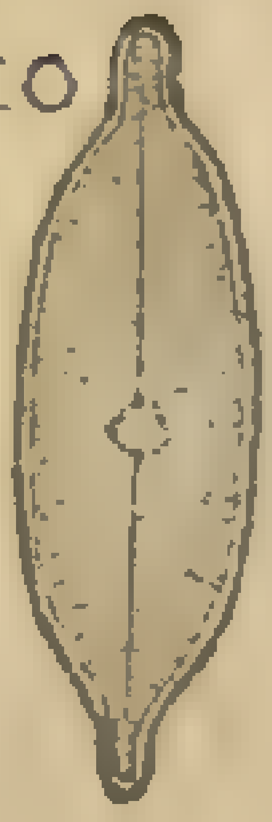

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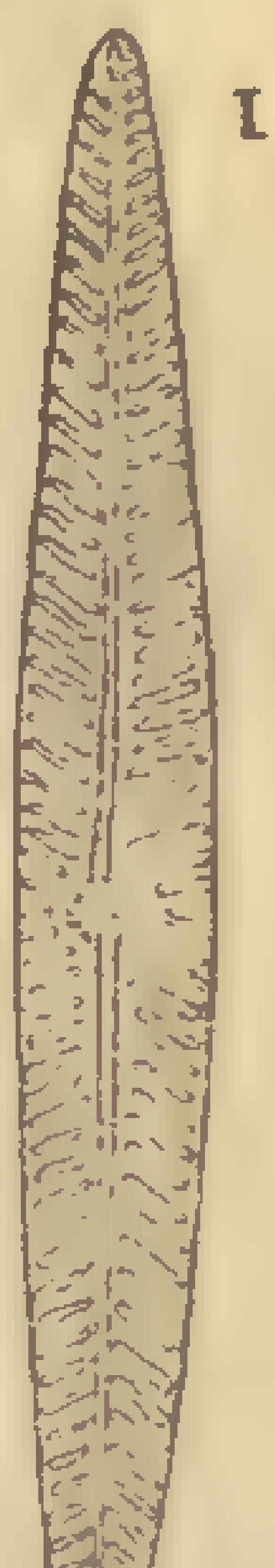

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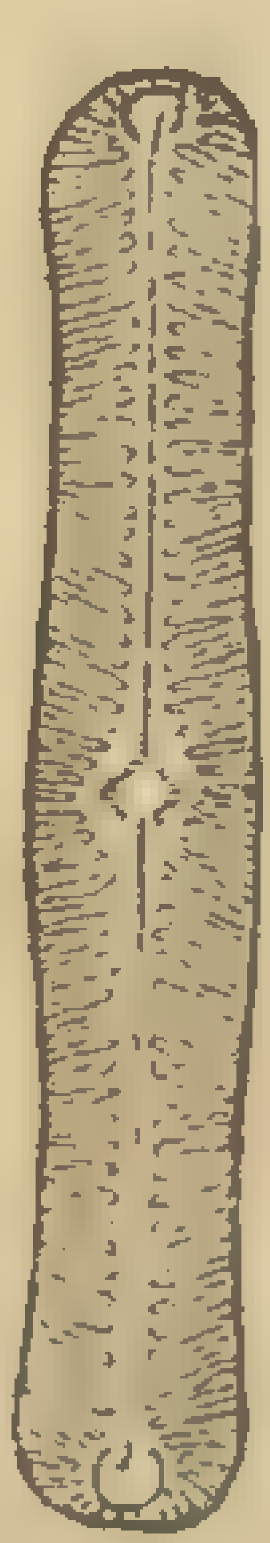

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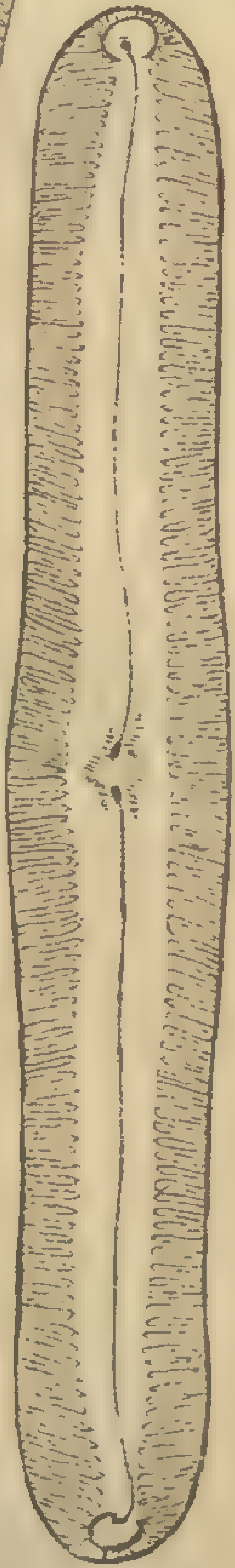

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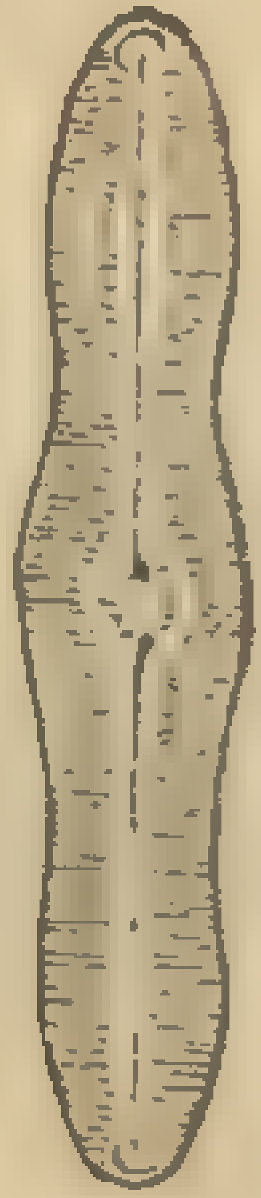

Staten Island Diatoms.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XIV.] New York, June, 1887. [No. 6.

A Descriptive List of Staten Island Diatoms.*

BY E. A. SCHULTZE.

Plate LXIX.

NAVICULA VIRIDIS, Kütz.

Navicula viridis, Van H., Syn. Diat. Bel., pl. V., fig, 5; Sm., Syn., p. 54, pl. XVIII., fig. 163; Kütz., Bacill., p. 97, t. IV., fig. 18, t. XXX., fig. 12; Schum., Diat. d. H. Tatra, p. 71, t. III., fig. 47; O'Meara, Rep. on the Irish Diat., p. 341, pl. XXX., fig. 3; Ralfs in Prit. Infus., p. 907, pl. IX., figs. 135, 136; Rab. Süss. Diat., p, 42, t. VI., fig. 4; Brun. Diat., p. 83, pl. VIII., fig. 5.

Navicula viridula, Kütz., Bacill., XXX., 47; Cl. and Gr., Arct. Diat., p. 33, t. II., fig. 35; Van H., pl. VII., fig. 25.

Pinnularia viridula, W. Sm., Syn., Vol. I., p. 57, pl. XVIII., fig. 175.

Bacillaria viridis, Nitsch, t. VI., figs. 1–3.

Pinnularia viridis, W. Sm.

Valve elliptical linear, with rounded apices; costæ parallel, broad, slightly radiant, shorter opposite the central nodule; a longitudinal, free, median space.

Hab.—Fresh water, frequent. Clifton, New Brighton, New Dorp. (Plate LXIX., fig. 1.)

This species has been attributed to various authors, but if Kützing be right in supposing it to be the *Bacillaria viridis*, Nitsch, 1817, it should be attributed to the last named author, as Heiberg has done. Smith assigns the species to himself, although regarding it as = *Navicula viridis*, Ehr. Rabenhorst attributes it to himself, while Grunow attributes it to Kützing. Grunow makes this form the type of the group Virides, but seems to regard *Navicula major*, which he includes among the Nobiles, to be only a variety of *Navicula viridis*. Speaking of this former he says: "It appears to me to be only a variety of *Nav. viridis*; tolerably numerous figures which lie before me present such manifold transitions, as well in respect to the appearance of the striation as to the outline of the form, that in most cases it is difficult to decide whether the specimen should be referred to one or the other." The correctness of this remark is obvious to all careful observers, but still the species seem to be distinct.

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* Continued from page 73.

The following characters seem to distinguish *Navicula viridis* from *N. major :* The costæ are finer and less radiate ; the median free space is narrower and less expanded around the central nodule, and the normal outline is linear-elliptical.—*O'Meara.*

NAVICULA PUSILLA, W. Sm.

Navicula pusilla, Sm., Syn., Vol. i., p. 52, pl. XVII., fig. 145; Ralfs in Prit. Infus., p. 900; Donkin, Brit. Diats., p. 20, pl. III., figs. 6a and 6b.; Brun., p. 75, pl. VII., fig. 36b; Van Heurck, Syn. Diat. Belg., pl. XI., fig. 17; O'Meara, Rep. on the Irish Diat., p. 381, pl. 32, fig. 14; Rabenh., E. Diat., p. 193.

Navicula gastroides, Greg.

Navicula tumida, var. *subsalsa*, Grunow.

Valve small, broadly oval with produced short truncate ends ; striæ distinct, moniliform and reaching to the median line, convergent opposite the central nodule and radiate towards the apices.

Hab.—Brackish water, scarce. Salt Meadows at New Dorp. (Plate LXIX., fig. 2.)

Prof. Gregory distinguished his *Navicula gastroides* from this species by its stouter habit and larger size ; but we unite them, as Prof. Smith has done, being unwilling to add another doubtful species to this group, which we believe is already too numerous.—*Ralfs.*

NAVICULA OBLONGA, Kütz.

Navicula oblonga, Kütz., Bacill., p. 97, t. IV., fig. 21; Ralfs in Prit. Infus., p. 907; O'Meara, Rep. on the Irish Diat., p. 344, pl. 30, fig. 10; Van Heurck, Syn. Diat. Belg., pl. VII., fig. 1.

Pinnularia oblonga, Brun., p. 82, pl. VIII., fig. 3; Sm., Syn., Vol. i., p. 55, pl. XVIII., fig. 165; Rabenh., Süssw. Diat., p. 45, t. VI., fig. 6.

Navicula macilenta, Ehr., Infus., 1838, t. XXI., fig. 13.

Pinnularia macilenta, Ehr., 1844.

Pinnularia polyptera, Ehr. 1844.

Valve elliptical linear, with broad, rounded extremities, costæ stout, convergent at the centre, and radiate towards the ends ; intermediate free space narrow, but roundly expanded at central nodule.

Hab.—Fresh water; New Brighton, Clifton, New Dorp, frequent. (Plate LXIX., fig. 3.)

We follow Kützing and Smith in referring *P. macilenta*, Ehr., to this species. Ehrenberg's figures, however, differ from theirs in being more linear, with less tapering apices.—*Ralfs.*

The form described by Rabenhorst, Süss. Diat., p. 45, t. VI., fig. 6, as *Pinnularia oblonga*, is obviously different from the present species.—*O'Meara.*

NAVICULA MESOTYLA, Ehr.

Navicula mesotyla, Kütz., Bacill., p. 99, t. V., fig. 3, t. XXVIII, fig. 84; Ralfs in Prit. Infus., p. 895; Schumann, Diat. der Hohen Tatra, p. 77, pl. IV., fig. 51.

Valve with triundulating margins terminating in obtuse rounded apices; striæ slightly connivent; longitudinal free median space broader at the nodules and between the outward bulging undulations.

Hab.—Fresh water; New Dorp, rare. (Plate LXIX., fig. 4.)

NAVICULA MESOLEPTA, Ehr.

Navicula mesolepta, Kütz., Bacill., p. 101, t. XXVIII., fig. 73, t. XXX., fig. 34; Ralfs in Prit. Infus., p. 894; Van Heurck, Syn. Diat. Belg., pl. VI., figs. 10, 11.

Pinnularia mesolepta, Sm., Syn., Vol. i., p. 58, pl. XIX., fig. 182.

Valve elongated linear; margins triundulating, forming three equal central inflations, and terminating in broad, rounded extremities; costæ reaching to the median line.

Hab.—Fresh water, scarce. New Dorp. (Plate LXIX., fig. 5.)

NAVICULA RHOMBOIDES, Ehr.

Navicula rhomboides, Kütz., Bacill., p. 94, t. XXVIII., fig. 45, t. XXX., fig. 44; Rabenh., Süssw. Diat., p. 38, t. V., fig. 13; Sm., Syn., Vol. i., p. 46, pl. XVI., fig. 129, and Vol. ii., p. 90; Ralfs in Prit. Infus., p. 903; Donkin, Brit. Diat., p. 42, pl. VI., fig. 11; Brun, Diat. Alpes and Jura, p. 64, pl. VII., fig. 3f; Van Heurck Syn. Diat. Belg., pl. XVII., fig. 1; O'Meara, Rep. on the Irish Diat., p. 374, pl. XXXI., fig. 49; Schumann, Diat. der Hohen Tatra, p. 68.

Valve rhomboid-lanceolate; extremities slightly rounded; striæ exceedingly fine and parallel; central nodule but little developed, and hardly visible between two longitudinally juxtaposited cones formed by two median lines convergent toward the end nodules.

Hab.—Fresh water, frequent. (Plate LXIX., fig. 6.)

NAVICULA INFLATA, Kütz.

Navicula inflata, Kütz., Bacill., p. 99, t. III., fig. XXXVI., 1, 2, 3; Sm., Syn., Vol. i., p. 50, pl. XVII., fig. 158; Donkin, Brit. Diat., p. 21, pl. III., fig. 9; Ralfs in Prit. Infus., p. 899; Brun, Diat. Alpes and Jura, p. 76, pl. VII., fig. 15; O'Meara, Rep. on the Irish Diat., p. 413, pl. XXXIV., fig. 23.

Pinnularia inflata, Rabenh., Sussw. Diat., p. 44, t. V., fig. 10 c.

Navicula follis, Ehr.

Valve small, elliptical, with obtuse truncated extremities and inflated centre; striæ moniliform, radiate, reaching to the median line.

Hab.—Fresh water, occasional; New Dorp. (Plate LXIX., fig. 7.)

NAVICULA LATISSIMA, Greg.

Navicula latissima, Donkin, Brit. Diat., p. 17, pl. III., fig. 2; Ralfs in Prit. Infus., p. 903; O'Meara, Rep. on the Irish Diat., p. 379, pl. XXXII., fig. 6.

Pinnularia divaricata, O'Meara, Q. Mic. Jour., n. s., Vol. VII., p. 116, pl. V., fig. 7.

Valve broadly elliptical, extremities slightly produced; intermediate free space expanded around the central nodule; striæ distinctly moniliform, convergent opposite the central nodule, and radiate towards the ends.

Hab.—Marine, not abundant. South Beach, in deep water. (Plate LXIX., fig. 8.)

NAVICULA SPHÆROPHORA, Kütz.

Navicula sphærophora, Kütz., Bacill., p. 95, t. IV., fig. 17; Sm., Syn., Vol. 1, p. 52, pl. XVII., fig. 148; Rabenh., Sussw. Diat., p. 40, t. VI., fig. 65a; Ralfs in Prit. Infus., p. 899; Donkin, Brit. Diat., p. 34, pl. V., fig. 10; Van Heurck, Syn. Diat. Belg., pl. XII., fig. 2; O'Meara, Rep. on the Irish Diat., p. 360, pl. XXXI., fig. 11; Brun, Diat. Alpes and Jura, p. 67, pl. VII., fig. 16.

Valve elliptical, constricted into produced capitate apices; striæ punctate and slightly convergent, not reaching the median line.

Hab.—Fresh water, not frequent. Clifton. (Plate LXIX,, fig. 9.)

NAVICULA PUNCTATA, Kütz.

Navicula punctata, Donkin, Brit. Diat., p. 36, pl. V., fig. 12; O'Meara, Rep. on the Irish Diat., p. 380, pl. XXXII., fig. 10.

Stauroneis punctata, Kütz., Bacill., p. 106, t. XXI., fig. 9; Sm., Syn., Vol. i., p. 61, pl. XIX., fig. 189; Ralfs in Prit. Infus., p. 912; Van Heurck, Syn. Diat. Belg., pl. X., fig. 14; Brun., Diat. Alpes and Jura, p. 90, pl. IX., fig. 4.

Stauroptera punctata, Rabenh., Sussw. Diat., p. 50, t. IX., fig. 11.

Valve elliptical, extremities capitate, narrow; striæ punctate, radiate and interrupted at the central nodule by a stauroneiform blank space not reaching the margin of the valve.

Hab.—Fresh water. In streams, Clifton, frequent though not abundant. (Plate LXIX., fig. 10.)

This species has been placed in the genus *Stauroneis* by Kützing, on account of the peculiar shortening of the striæ opposite the central nodule; it is, however, a genuine *Navicula.*— *Donkin.*

NAVICULA LONGA, Greg.

Navicula longa, Ralfs in Prit. Infus., p. 906; Donkin, Brit. Diat., p. 55, pl. VIII., figs. 3a and 3b; O'Meara, Rep. on Irish Diat., p. 344, 345, pl. 30, fig. 11.

Valve lanceolate, narrow; costæ stout, radiate, shorter opposite the central nodule.

Hab.—Marine. South Beach on submerged timber. (Plate LXIX., fig. 11.)

NAVICULA RECTANGULATA, Greg.

Navicula rectangulata, Greg., Diat. of the Clyde, p. 7, pl. I., fig. 7; Ralfs in Prit. Infus., p. 907; Donkin, Brit. Diat., p. 66, pl. X., fig. 5; O'Meara, Rep. on Irish Diat., p. 343, pl. 30, fig. 8.

Pinnularia rectangulata, Rabenh., p. 215.

Valve linear, with broadly rounded ends, bulging at the middle; intermediate free space narrow, but roundly inflated in the middle; costæ stout, converging opposite the inflated space and radiate towards the extremities.

Hab.—Marine. South Beach. (Plate LXIX., fig. 12.)

NAVICULA MAJOR, Kutz.

Navicula major, Kutz., Bacill., p. 97, t. IV., figs. 19 and 20; Ralfs in Prit. Infus., p. 896, pl. VII., fig. 65; Donkin, Brit. Diat., p. 69, pl. XI., figs. 2a and 2b; Van Heurck. Syn. Diat. Belg., pl. V., figs. 3 and 4; Schum., Diat. der Hohen Tatra, p. 70.

Pinnularia major, Rabenh., Sussw. Diat., p. 42, t. VI., fig. 5; Sm., Syn., Vol. i., p. 54, pl. XVIII., fig. 162; Brun., Diat. Alpes and Jura, p. 84, pl. VIII., fig. 1.

Valve broad, linear, distended in the middle and at the rounded extremities; intermediate free space broad; central nodule large and round; costæ stout, convergent opposite central nodule and slightly radiate towards the extremities.

Hab.—Fresh water, frequent. (Plate LXIX., fig. 13.)

This species scarcely differs from *N. nobilis* and *N. gigas*, except by its somewhat smaller size and closer pinnules.—*Ralfs.*

NAVICULA LIMOSA, Kütz.

Navicula limosa, Kutz., Bacill., p. 101, t. III., fig. 50; Rabenh., Sussw. Diat.,

p. 41, t. VI., fig. 31; Ralfs in Prit. Infus., p. 894; Donkin, Brit. Diat., p. 73, pl. XII., figs. 6a and 6b; Brun, Diat. Alpes and Jura, p. 73, pl. VII., fig. 12; O'Meara, Rep. on the Irish Diat., p. 368, pl. 31, fig. 30; Van Heurck, Syn. Diat. Belg., pl. XII., fig. 18.

Navicula gibberula, Kutz, Bacill., p. 101, t. III., fig. 50*; Sm., Syn., Vol. i., p. 51, pl. XVII., fig. 160; Ralfs in Prit. Infus., p. 895; Schumann, Diat. der Hohen Tatra, p. 76; Brun, Diat. Alpes and Jura, p. 73, pl. VII., fig. 11; O'Meara, Rep. on the Irish Diat., p. 368; Van Heurck, Syn. Diat. Belg., pl. XII., fig. 19.

Navicula leptogongyla, Kutz., Bacill., p. 99, t. IV., fig. 9; Rabenh., Sussw. Diat., p. 41, t. V., fig. 8; Ralfs in Prit. Infus., p. 895.

Valve with triundulating margin terminating in cuneate extremities and forming three inflations, of which the central is the largest; longitudinal free space narrow and slightly expanded at the middle; striæ fine and transverse.

Hab.—Fresh water, frequent. (Plate LXIX., fig. 14.)

Kützing seems to have relied on size and outline in separating *N. gibberula* as a species distinct from *N. limosa*.—*Donkin.*

Note on the Flowers of Populus heterophylla, L.

It appears that the flowers of this poplar have never been fully and accurately described. Dr. Torrey, in the Flora of New York, remarks that he had not seen the staminate catkins, and there are none in his herbarium. Having recently had occasion to collect a large number of both kinds of catkins at the time when they were just mature (May 8), I made a careful examination of them, and here place my observations on record.

The staminate are from 5 cm. to 7 cm. long, oblong, 15 mm. thick; they are extremely fragile, merely shaking the tree causing them to fall to the ground in great numbers, while a hard rain was noticed to have the same effect. They do not fall away from the branch entire under such circumstances, but break off at a short distance from the base; they are borne singly on wood of the previous year a few inches from the terminal buds of the present, but rarely more than two on each twig. They are composed of numerous flowers, very densely aggregated when young, but becoming looser in the elongation of the axis. Their flowers consist of an oblique disc with spreading border, somewhat concave in the middle, which supports numerous stamens (in one 44 were counted); the anthers are oblong and obtuse, 3 mm. long by 1 mm. broad, flat on the dorsal side and provided with a low central ridge and two slight parallel grooves on the ventral side; the filaments are capillary and nearly the length of the anthers; the staminate scales are very early deciduous, falling away as the catkin elongates in growth; they are 5–6 mm. long and about the same width, with a cuneate base abruptly expanded above and lacerated, the lateral divisions ciliate; the line of junction of the lacerated portion with the basal part is of a darker color than the base and quite conspicuous.

The pistillate catkins are from 2 to 5 cm. long when the stigmas reach a receptive condition, and this appears to be the case just as the male flowers are mature. Their flowers consist of a single pistil in a calyx about 2 mm. high and half as wide, lacerate toothed at the summit and borne on a peduncle 2 mm. long (which elongates in fruit to 15-20 mm.); the pistil is about 10 mm. high, its ovary obtusely triangular in section, with slightly concave sides and ovoid in shape, provided with three broad, parietal placentæ, and containing many ovules; the style is slender and 2 mm. long; the stigma at first appears irregularly ridged, is 5 mm. across, and very fleshy, but not glutinous, and soon parts into three lobes, each of which is two or three-lobed, forming a quite complex structure. The pistillate scales are attached near the base of the peduncle, are 8-10 mm. long, concave around the flower, and provided with small lobes just above the stalk-like, flat base, and are ciliate all around, except the lower portion below these lobes. These scales are also fugacious, falling off with the slightest shock.

A correction must be made in Dr. Watson's "Notes on American Poplars," in Amer. Journ. Sci., Vol. xv., 1878, where *P. heterophylla* is grouped with *P. tremuloides*, Michx., and *P. grandidentata*, Michx., "styles two, with two or three narrow or filiform lobes." The style-lobes are dilated, and three in number. My specimens were obtained near Court House Station, Staten Island, where the tree is quite abundant on the borders of swamps. I will gladly supply both kinds of flowers to those who care for them, and will collect mature fruit and leaves for distribution later in the season.

N. L. BRITTON.

COLUMBIA COLLEGE, May 10, 1887.

Some Californian Ranunculi.

By Edward L. Greene.

The first one I would mention, although it is a very common plant of the California Coast Range, and especially plentiful among the hills back of Oakland and south of San Francisco, was first noticed in the Botany of the State Geological Survey (1876), where it is named *R. hebecarpus*, var. *pusillus.* The flowers of this plant have not yet been described. They are so minute as to become, in the dried specimen, nearly invisible. Even with the fresh plant in hand, something better than a pocket lens is requisite to the revealing of their characteristics, which are very unique indeed. They are remarkable among flowers of this genus both for the extreme paucity of their parts, and for the very curious kind of symmetry which they display.

By way of preparing the reader's mind to rightly appreciate the symmetry referred to, and which I am about to describe, let me say that the flowers of Ranunculi in general are not so wholly unsymmetrical as they are commonly allowed to be. The sepals are five, the petals five (in some species ten or fifteen), the stamens and pistils both (theoretically at least, and often in fact), of some larger multiple of five. Of the species here under consideration, I have examined this year some scores of examples, and I find the following to be the rule of its floral structure. It has, instead of the five sepals of ordinary Ranunculi, four only; and these four sepals are, moreover, not flat and reflexed according to the rule in the genus, but spreading and somewhat cymbiform, each embracing a pistil, much after the manner in which a number of the Californian Compositæ have the ovaries of their ray-flowers enfolded each by a corresponding involucral bract.

In the place of the missing sepal of the five there occurs, ordinarily, not a petal but a stamen. That this particular stamen, which stands by itself alongside the one akene that lacks a subtending sepal, replaces the missing sepal we know from the fact that the stamens themselves are as definite in number as are the sepals, each of them as strictly keeping its own place; and the stamens too are four only. The petal is solitary, and, instead of taking the place, as it might have been expected to do, of the missing sepal, it appears on the opposite side of the flower, there replacing what might have been a fifth stamen. We have then, so far, four sepals, one petal and four stamens, making collectively nine parts of the flower; and the symmetry is completed, up to the requisite number of fifteen parts, by the pistils being, as they almost always are, just six, of which five are inserted in a whorl around the margin of the minute receptacle, and the sixth sits centrally and apart from the rest on the summit of it. Such is the ordinary number and arrangement of the parts of the flower in this most interesting little plant. I have observed, however, not a few instances of deviation from the rule; but these have been what may be called, if the paradoxical phrase may be allowed, very regular deviations from the rule, not affecting the numerical total of fifteen parts to each flower. There may be five pistils and two petals, the stamens and sepals each remaining four; or five pistils, five stamens, one petal and four sepals. When the petals are two, one of them takes the place of the missing sepal and is, in some respects, intermediate between a sepal and a petal, being uncommonly large for a petal of the species, and destitute of any trace of the nectariferous pit. In this case, too, the second petal is reduced in size, and appears like a kind of half-way affair between petal and stamen. The normal solitary petal seen under a good magnifier consists of rather distinct lamina and claw, with a comparatively large nectariferous pit (without scale) located at base of the lamina, which last named part about equals the claw in length. The plant is strictly annual, very slender, weak and often reclining, growing in shady and rather wet places, often in company with *Montia fontana.* The typical *R. hebecarpus* inhabits the Sierra Nevada, rather beyond my reach. It is quite different in appearance, and, although much cannot be learned about its flowers from the dried specimens, its akenes are many and quite indefinite, forming a close round head. For the variety here described I dare not yet propose that specific name and rank which it will some day command, if the other fail to exhibit more or less of its really wonderful characteristics. I wait for some possible coming opportunity of comparing the two in living specimens.

From this, perhaps, smallest of all Ranunculi, I pass to give an account of what is no doubt the very largest of the genus, namely:

RANUNCULUS MAXIMUS. Stems thick and fistulous, 2 to 5 feet long, but weak and reclining: herbage more or less bristly-hirsute: leaves broad, alternately divided, the radical on petioles 1 to 1½ feet long, leaflets laciniately lobed; petals five to eight, and 10 lines long, oblong-obovate, obtuse, the nectariferous scale correspondingly large; akenes compressed, but not strongly so, rather thick, tipped with a long, stout, erect, slightly incurved style, forming a globose or round-ovate head. *R. macranthus*, Brew. & Wats., Bot. Cal., i, 8, not of Scheele; *R. orthorhynchus*, var. *platyphyllus*, Gray, Proc. Am. Acad. xxi, 377, as to the Californian plant at least.

Were I compelled to choose between the two different disposals of this plant which have been made by the authors above cited, I should take the first. It is surely every way more like the Mexican *R. macranthus* than it is like *R. orthorhynchus* of the Columbia River region. The good fruit characters of the latter species, as shown in well-matured specimens from near Portland, Oregon, and which agree perfectly with Hooker's figure, are these: a much compressed thin akene; styles rather slender, perfectly straight and conspicuously spreading, i. e. standing out in all directions at right angles with the center of their axis, giving a very bristling aspect to the head. In *R. maximus* they are, as I have said, not only not straight; they are spreading, but in a less degree, pointing in a direction more inclined to a parallel with the axis. The remarkable differences of foliage, size and habit of the two plants need not here be repeated. They can be learned by reference to any description of the original and unconfused *R. orthorhynchus*.

Our most common Californian species of this genus, the one which makes yellow with its brilliant bloom all the running hillsides of the western parts of the State in the months of March and April, appears to have been passing for many years under a name which, by right of priority, does not belong to it, and which should therefore be rejected from henceforth. It is

Ranunculus Deppei, Nutt. in Torr. and Gray, Fl. N. Am. i, 21 (under *R. acris*), A.D., 1838=*R. Californicus*, Benth. Pl. Hartw., 295, A.D., 1857.

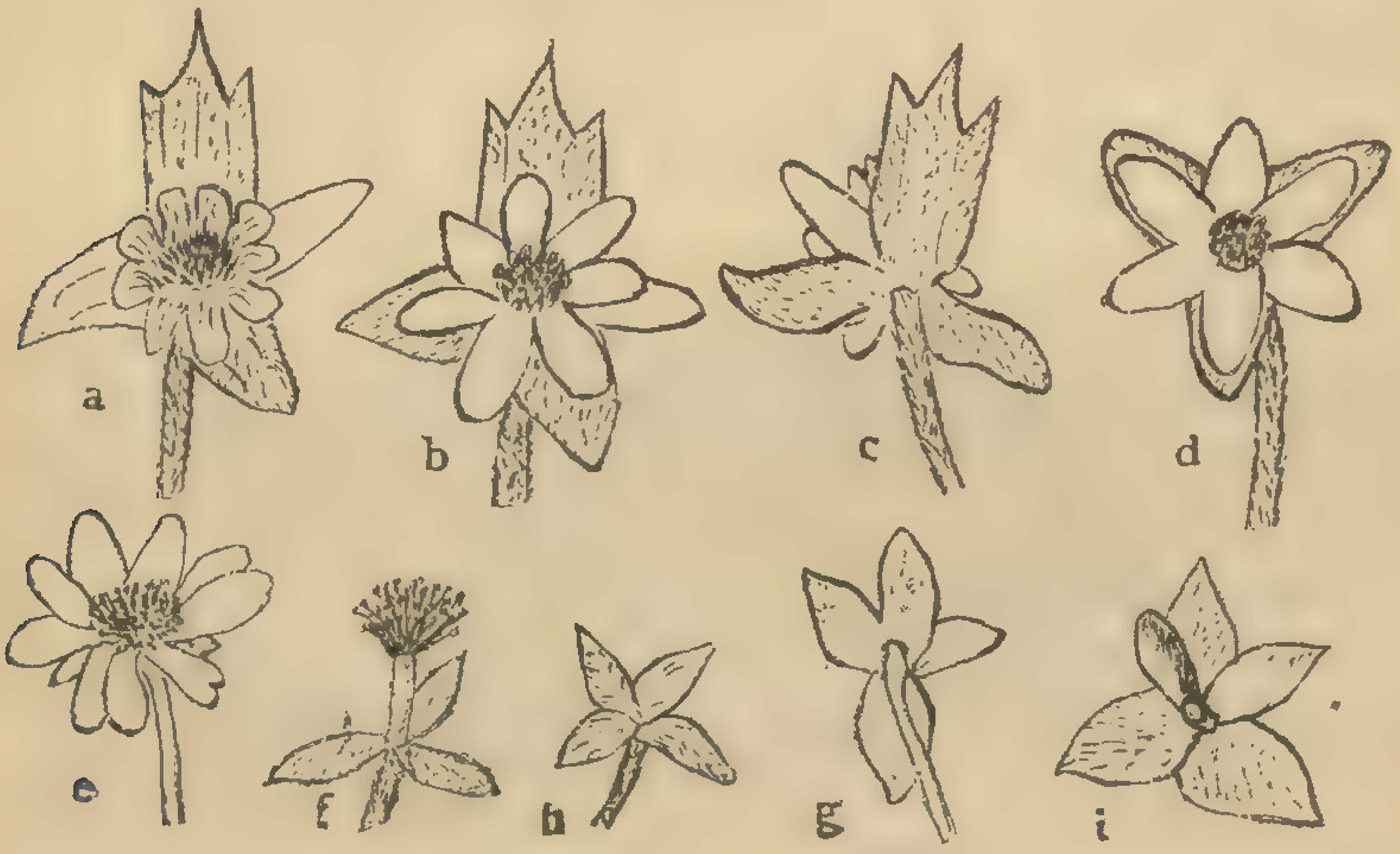
Both Ferdinand Deppe, (1832) and Thomas Nuttall, 1836, had familiar knowledge of the species in their Californian travels about a dozen years before Theodore Hartweg came this way. Nuttall named the species for Deppe, it would appear. Then, some twenty years later, Mr. Bentham in treating of Hartweg's Californian collections, named the plant *R. Californicus*, and this new synonym was forthwith adopted by the American authorities, who thus relegated to obscurity or oblivion the true and rightful name.

Diœcism in Anemone acutiloba, Lawson.

In the *Anemone acutiloba*, Lawson, there is a manifest tendency to be diœcious. A year ago a plant was found, all the flowers of which were strikingly different from those of other plants near by. The dark-blue calyx was much smaller than the involucre, and the stamens were wanting. The pistils were from thirty-five to forty in each blossom, or about double the average number in perfect flowers. Only abortive stamens were found in two of the flowers. The stamens are numerous in normal flowers, and on account of their absence, if for no other reason, the blossoms under consideration appeared different from the ordinary sort. In addition to the absence of the stamens and the small size of the calyx, there was an unexpected development of the involucre. Instead of the ordinary number, there was a fourth bract which, although green, had the size and shape of the sepals. It, however, occupied a position close by the sides of the other bracts, and made up a part of the involucre which, in this *Anemone*, is situated a half inch or more below the flower.

Another deviation noticed in the involucre, was the much greater development of one of the bracts, and the dentate or notched tip which it possessed. The flower under consideration is shown (natural size) at *a* in the engraving. At *b* the same flower is seen with the calyx laid back so as to better indicate its size and the appearance of the centre of the flower with its pistils only. A rear view of the same blossom is given at *c*. In all of these the exaggerated size of one bract is easily seen, as also the manner in which its tip is developed into three quite sharp teeth. It is also not difficult to locate the fourth bract, which is seen to be much smaller than the other three, and in shape like the sepals. There is also the absence of that hirsutness characteristic of all leafy parts of the plant.

The appearance of a pistillate flower without any monstrous developments, is shown at *d*. Here the regularity of parts is well observed. The bracts are of equal size, and are somewhat broader and longer than the six equal-sized sepals situated a short distance above them.



No staminate flowers were found last year; but this spring they came to light and were discovered by a student while examining specimens of the *Hepatica* in class. The stamens are more numerous than in perfect flowers. In ordinary blossoms there are about thirty stamens, while in the staminate flowers there were forty or more. The pollen from these male flowers was found, by measurement, to be of the same size (40-45 microm.) as that of perfect flowers, and to all appearance the same. A staminate flower, natural size, is shown at *e*. It will be observed that the sepals are much longer than the bracts, and shut them from view when looking down upon the flower. A staminate flower with the sepals removed is shown at *f*. The distance between the involucre and the flower is here seen. In older flowers this is much more, and when the plant is in fruit, the separation is still greater.

At *g* is seen a form of the involucre of perfect flowers that is sometimes found. At first sight there are four bracts, but a further inspection shows that two of them are united at the basal end and side. However, the smallest of the three or four, as the case may be, is situated above the others, and bears a strong resemblance in form and texture to the sepals. If this one be an extra bract, it is natural to consider the deeply lobed bract as made up of two. Sometimes the four bracts are all of the same size, and are disposed in the form of a cross, as seen at *h.* The most interesting involucre, morphologically considered, is perhaps the one shown at *i.* In this there are four bracts, three of which are of nearly the same size, and the fourth smaller but green and hairy. This one occupies a place just above the larger and lower three. In the circle of sepals was one, a little larger than the others, one-half of which was green while the balance of the organ was white and petal-like. The green portion of the sepal is shown shaded in the engraving. This organ is fully a third of an inch above the abnomal involucre.

The tendency toward a cleft condition of the bracts of the involucre is not extraordinary when we know that this *Hepatica* is now placed in the same genus with several species where the involucre, although quite remote from the flower, is made up of foliar organs which are often much incised. *Anemone nemorosa* L., and *A. dichotoma*, L., may be mentioned as close confreres in the genus, while on the other side is the old *Thalictrum anemonoides*, Michx., which Spach placed in a new genus, namely, *Anemonella.* The tip of our abnormal bract is more like that of a leaflet of the *Anemonella*, or of a leaflet of *Thalictrum dioicum*, L. The diœcious tendency also points in the same direction.

Each reader is left to draw his own conclusions as to what the outcome in the future centuries may be; whether we shall then have a truly diœcious species in *Anemone acutiloba* or one divested of all traces of a separation of the sexes.

BYRON D. HALSTED.

Ames, Iowa, April 22, 1887.

Some Anomalous Forms of Saxifraga Virginiensis.

Along the steep rocky bank near the east shore of upper Manhattan Island there is a place, about on a line with One-hundred-and-sixtieth street, where *Saxifraga Virginiensis*, Michx., still grows abundantly. On April 17th of the current year, when the plants were just coming into full flower, I noticed among them one with apetalous blossoms, the conspicuous yellow anthers making a noticeable contrast with the pure white petals of the ordinary form. I collected the plant, but, unfortunately, lost it before a critical examination had been made. A week later I visited the place again, and found fully a dozen of these peculiar apetalous *Saxifragæ* growing within a few feet of each other and only a few feet from the site of the one first observed.

Upon close investigation these plants proved to be unquestionable *S. Virginiensis.* In size, however, they were decidedly below the average of the normal form, the slender scapes being only two to four inches high, and there was no trace of petals or anything of a petaloid appearance discoverable in any of them. In most of the plants the flowers were few, small and singularly imperfect as regarded the stamens. These were a mere jumble, some of them only withered stumps of filaments, others sessile anthers greenish in color and curiously like ovaries in shape, and not one in twenty was normal in form or appeared capable of producing pollen. The pistils, though small, seemed the same as usual, but in general aspect the flowers were melancholy abortions, and if these specimens had been the only ones secured I should have concluded that the plants were merely the natural imperfect growth from imperfect seeds, and should have given them no further consideration.

Happily, however, two out of the dozen or more collected were very different from their weaker brethren. In these two, which had more stocky scapes and a generally healthier look, I was surprised to find that nature had been creditably successful in establishing a new and definite order of things. In other words, the variation from the normal structure of the flower consisted in the regular conversion of the petals into stamens—that is to say, a single stamen stood opposite each calyx-lobe, and an anteposed pair opposite each calyx-sinus. This made the total number fifteen, the extra outer five occupying precisely the positions of the five petals. The exact order here indicated prevailed in fully half the flowers on the two plants. In the others some part of the outer whorl was altogether missing, but there were always at least one or two of the anteposed pairs. In one case two such pairs were crowded in opposite a calyx-sinus, making seventeen perfect stamens in the one blossom. The pistils in these two plants appeared entirely normal. The anthers were rather larger than in the ordinary flowers, and, when ripe, had slightly reddish tips. Even in the bud they were fully exposed, the calyx-lobes not being large enough to close over them, a peculiarity which gave the plant a little resemblance to the common mignonnette. I cannot say that this new form of *Saxifraga Virginiensis* is any prettier than the old-fashioned one, or even as pretty, but certainly in the fresh state the naked compact star-shaped clusters of anthers presented a very odd and interesting appearance, stoutly usurping, as they did, the places of the ousted petals, and ranging in color from red-tipped yellow in the full-grown flowers to translucent white in the smaller buds.

So far as I can learn, the form of *Saxifraga Virginiensis* here described is entirely unmentioned in botanical records. Other freaks of the species, however, are duly recorded. William Oakes, in Hovey's Magazine of Horticulture and Botany for May, 1847, established, on a plant found at Topsfield, Mass., in 1842, the "variety *chlorantha*, petals pale green instead of snow-white, . . . and margins and backs sprinkled with short hairs. . . . " There is no hint of more than one plant of this form having been observed by him, and the case, as the name frankly intimates, was plainly one of simple chloranthy, a form of teratology by no means infrequent.

Another freak is recorded by Mr. Meehan, who reported in the American Naturalist for August, 1872, the finding of a double-flowered specimen at Woburn, Mass. In the BULLETIN for October of that year Mr. Leggett quotes this, and adds that he had seen a similar specimen.

If we regard the two plants which I have described as merely teratologic, we shall still find them of unusual interest, for they exemplify perfectly the rare staminody of petals, the exact reverse of the usual change. So rare is this metamorphosis of petals to stamens that Masters, in his Vegetable Teratology, records only two or three perfect examples of it. In the common shepherd's purse, *Capsella Bursa-pastoris*, he says such a change "has been observed," but he quotes no authority. The one positive case, which seems to rest on his own observation, he states in these words: "There is in cultivation a form of *Saxifraga granulata*, wherein the petals are replaced by stamens, so that there are fifteen stamens."

S. granulata is a common European species, with large and handsome white flowers, and has been a garden plant for many years, and it is pretty certain that the variation occurred in some florist's establishment, and, being an oddity, was maintained in cultivation for a while by division, quite independent of seeds. In the present case, however, the new form appears in the wild state, and the plant must produce good seeds "after its kind" in order to be perpetuated and diffused. To my mind the evidence is considerable that it is already doing this.*

Now, why has this change occurred in two species of the self-same genus, separated as to station by over a thousand leagues of land and water? Is this identity of variation in *S. granulata* and *S. Virginiensis* a mere coincidence? Or have we here a striking case of atavism? Is this variation the recurrence, in the descendants, of the peculiar and long obsolete structure of their common ancestor? Was the progenitor of the hundred and sixty or more distinct *Saxifragæ* of to-day a plant with apetalous and fifteen-stamened flowers? We shall never know with certainty, but two of its descendants testify strongly in the affirmative. I would even go a step farther, and hazard the conjecture that the original of the Saxifrages was diœcious, or at least polygamous. In the two perfect plants I have described the stamens were remarkably vigorous and well developed. In the ten or more others the stamens, as I have said, were singularly imperfect, and numbers of them were curiously ovary-like in appearance. Is it possible that these plants were blindly struggling to reproduce a primitive pistillate form? A certain confirmation of this idea is found in the fact that in *S. crassifolia* an abnormal increase in the number of pistils has been repeatedly observed.

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* In case the new form should perchance prove permanent, I propose for it the name: *Saxifraga Virginiensis*, var. PENTADECANDRA.—E. E. S.

The few conjectures in which I have indulged are confessedly mere speculation, and perhaps quite erroneous. However this may be, all botanists, I am sure, will agree that it will be well worth while to examine with special attention any apetalous *Saxifragæ* that may hereafter be detected.

E. E. STERNS.

The Lateral Lines in the Leaf of Erythroxylon Coca.

Commenting on the remarks of Prof. Schrenk, elsewhere indexed, the writer would present the following observations on these lines, made during an extended study of the living plant:

The leaf is longitudinally folded in the bud, the two lateral lines supporting the folds below, and the midrib and free borders of the leaf forming the upper edge of the bud. It does not necessarily follow that the lines are caused by the folding. The office of strengthening-tissues at such a point is obvious. It has long been accepted by importers that the prominence of these lines, and their proximity to the midrib, are characteristic of the quality of the leaf as a drug. As to the first part of this rule, it is borne out by the statements of the natives who chew the leaves. They select in preference a leaf exhibiting strongly pronounced lines; but I could not learn that their proximity to the midrib was at all considered by these people. Conditions of growth produce the greatest variation in the appearance of the leaf, particularly as to these lines, and a corresponding degree of difference in the amount of alkaloids contained. As soon as a plant escapes from cultivation the leaves deteriorate, and the lines grow fainter until they disappear altogether. If the plant escape to a "pajinal," as the bare sunny hillsides are called, the leaves become thick and pubescent; while if it escape to the deep forest they vary in the opposite direction, becoming large, pale, thin and flabby; but in either case the lines lose their prominence. I have extreme specimens of both these forms, with scarcely a trace of any lines, and in which no cocaine can be detected by the nerves of the tongue. H. H. RUSBY.

Index to Recent American Botanical Literature.

Autumnal Changes in Maple Leaves.—W. K. Martin and S. B. Thomas. (Bot. Gaz., xii., pp. 78-81; four figures.)

Boleti of the United States—Notes on the.—Chas. H. Peck. (Journ. Mycol., iii., pp. 53-55.)

Botanical Drugs—A Corrected List of the English Commercial Names of. (Supplement to the Pharmaceutical Era, Jan., 1887.)

Botanical Manuals for Students.—C. E. Bessey. Amer. Nat., xxi., pp. 376-379.)

This is a very convenient list of the most useful descriptive works on all groups of plants with special reference to the needs of American students. Approximate prices are given.

Botanical Tramp through North Carolina.—Gerald McCarthy. (Bot. Gaz., xii., pp. 76-78.)

Development and Distribution of Vegetatian—Sketches of the.—T. J. Burrill. (Bull. Sci. Assoc. Peoria, Ill., 1887, pp. 51, 52.)

Dicentra Canadensis. (Vick's Ill. Month. Mag., x., p. 152, one figure.)

Erythronium Americanum. (Vick's Ill. Month. Mag., x., p. 148, colored plate.)

Flora of Peoria.—J. T. Stewart. (Bull. Sci. Assoc. Peoria, Ill., 1887, pp. 28-33.)

A general account of the plants found in the vicinity of Peoria.

Flora of Rhode Island—Some Notes on the.—W. Whitman Bailey. (Proc. Newport Nat. Hist. Soc., 1885-'86, pp. 3-13.)

Forests of North America.—Prof. N. S. Shaler. (Scribner's Magazine, May, 1887.)

Fungal Disease of Colocasia.—J. H. Hart. (Bulletin of Information in regard to Agricultural Matters—I.)

Attention is called to a disease of *C. esculenta* and *C. antiquorum* which is prevalent in Jamaica.

History of Garden Vegetables.—E. Lewis Sturtevant. (Amer. Nat., xxi., pp. 321-333; continued.)

In this part Dr. Sturtevant gives notes on Australian Spinage, (*Chenopodium auricomum*, Lind.); Balm, (*Melissa officinalis*, L.) species of *Basella* used as spinage plants; Basil, (species of *Ocimum*); and Beans, (*Phaseolus vulgaris* and *P nana*.)

Horticultural Terminology.—I. L. H. Bailey, Jr. (Am. Garden, May, 1887.)

Immigration of Animals and Plants.—Fred. Brendel, M.D., (Bull. Sci. Assoc., Peoria, Ill., 1887, pp. 88-92.)

Indicative Plants.—R. W. Raymond, (Trans. Amer. Inst. Min. Eng., St. Louis meeting, October, 1886; advance sheets.)

A very interesting paper dicussing the various plants which are supposed to be indicative of metallic minerals. Figures are given of the zinc-violet (*Viola Calaminaria*) of Europe, the "lead plant" (*Amorpha canescens*) and of *Eriogonum ovalifolium* of the Rocky Mountain region, which Dr. Raymond thinks may be destined to bear the title of "silver plant." The interesting fact is recorded that in pink-flowered plants of the *Eriogonum*, the presence of arsenic was proved by chemical analyses made by Mrs. Richards, while in yellow-flowered ones arsenic was not found.

Leo Lesquereux.—Sketch of, with portrait. By L. R. McCabe. (Pop. Sci. Month., xxx., pp. 835-840.)

List of Works on North American Fungi, with the Exception of Schizomycetes, published before 1887.—W. G. Farlow and William Trelease. (Harvard Univ. Bull.. iv., pp. 444-458; to be continued.)

This is the first part of a most useful and voluminous bibliographical work, which we hope to note at greater length when it shall have been completed. The titles are under authors' names, which are arranged alphabetically.

Local Names of Plants.—C. F. Wheeler. (Pharm. Era., i., p. 25.)

Mr. Wheeler notes that *Cicuta maculata* is known as "Fletcher Weed," in Worcester Co., Mass., from the circumstance that in the early history of Oakham a woman named Fletcher, driven by hunger, ate some of the roots, which caused her death.

North American Fungi—The Eighteenth and Nineteenth Centuries of Messrs. Ellis and Everhart's.—C. E. Bessey. (Amer. Nat., xxi., pp. 379, 380.)

Nova Scotian Fungi—Additions to the List of.—J. Somers. (Proc. and Trans. Nov. Scot. Inst. Nat. Sci., vi., pp. 286-288.) Twenty-three species are enumerated.

Nova Scotia—New and Rare Plants of.—J. Somers. (Proc. and Trans. Nova Scotian Inst. Nat. Sci., vi., pp. 281, 282.)

Notes are given on *Cnicus muticus*, white-flowered *Cypripedium acaule*, *Apios tuberosa* with a very large tuber, *Solidago sempervirens* and *Polygala sanguinea*.

Oxytropis Lamberti. (Garden, xxxi., plate 552.)

Pacific Coast Alders.—C. C. Parry. (Bull. Cal. Acad. Sci., ii., pp. 351-354; reprinted.)

Dr. Parry gives a general account of the history of the American *Alni*, and concludes that *A. rhombifolia*, Nutt., of the Pacific Coast and *A. oblongifolia*, Torrey, of New Mexico, are but forms of the same species, Nuttall's name having priority.

Pharamacognostical Notes.—Joseph Schrenk. (American Druggist, April 1887.)

Valeriana, *Arnica*, *Serpentaria*, *Aconitum Napellus* and *Rhamnus Purshiana* are all remarked upon from a pharmacognostical standpoint. The two characteristic lines or ridges on the lower surface of the leaf of *Erythroxylon Coca* had been described by Hanausek and other authors as "folds" in the blade. Prof. Schrenk shows, by figuring a cross-section, that these lines consist of sub-epidermal strands of *collenchyma* cells, and suggests that they might serve as an elastic stiffening to the blade. Very curious forms of *branched* glandular hairs detected on the leaf of tobacco are described and figured. Prof. Schrenk found them rather abundantly on very young leaves, but quite sparingly on commercial tobacco.

Photograph of Ophioglossaceæ.

Mr. George E. Davenport has sent us a beautiful photograph of American Ophioglossaceæ, taken from a set prepared by him for the Middlesex Institute. He is willing to furnish copies to botanists at 35 cents each.

Pinus macrocarpa. (*Coulter's Pine.*) (Garden, xxxi., p. 378; two figures.)

Plant Heliostat.—Byron D. Halsted. (Bot. Gaz., xii., pp. 82, 83.)
Professor Halsted describes the curious habit of the leaves of *Malva borealis* in Southern California of following the sun in its daily course, always presenting their upper surfaces to the light. In cloudy weather this heliotropism is not nearly so marked.

Plants Collected in and around Truro, during the Summer of 1885—*Supplementary List of.*—G. G. Campbell. (Proc. and Trans. Nova Scotian Inst. Nat. Sci., vi., pp. 283-285.)
53 species are enumerated.

Plants of the Island of Rhode Island—Native.—II. (Proc. Newport Nat. Hist. Soc., 1885-6, pp. 13-15.)

Rhamnus—Californian Species of. (Pharm. Era., i., p. 150, from a paper by Jas. G. Steele in Pacific Rec. Med. and Surg.)

Scrophularia aquatica and S. nodosa—The Inflorescence, Floral Structure and Fertilization of.—T. Wemyss Fulton. (Trans. and Proc. Bot. Soc., Edinburgh, xvi., pp. 379-389, one plate.)

Tomato Rot. (Amer. Nat., xxi., pp. 380,381.)
The editor reviews Dr. Arthur's paper in the Fifth Annual Report of the U. S. Agricultural Experiment Station.

Ustilagineæ and Uredinæ—New Species of.—J. B. Ellis and B. M. Everhart. (Journ. Mycol., iii., pp. 55-57.)
Eleven new species are described.

Vegetacion sobre las altas Montañas de Mexico, (*The Vegetation of the high Mountains of Mexico.*) Henry de Saussure. (La Naturaleza, vii., pp. 333-349.)
This very interesting paper is a comparison of the vegetation on the volcanic cones of Mexico with that on the Alps, and some very singular conclusions are reached:

1st.—The forests extend to almost 5,000 feet greater altitude in Mexico than on the Alps and end abruptly without straggling or dwarfing. The distance between the timber line and the limit of perpetual snows in each is about 2,500 feet.

2d.—Herbaceous plants do not extend more than 4,000 feet higher than those on the Alps, and cease at the snow line.

3d.—The lichens do not reach any greater altitude, if as great, as they do on Mont Blanc.

After discussing the various meteorological differences and their effect on the vegetation, the author concludes that the causes which limit the extension upward of the herbaceous and cryptogamic vegetation in Mexico are æstival rather than hyemal.

Volutella Ellisii.—A. B. Langlois. (Journ. Mycol., iii., p. 57.)

Wisconsin Orchids.—John H. Dunlap. (Gard. Month., xxix., pp. 150, 151.)

Notes on the species observed by the author with especial reference to their cultivation.

Botanical Notes.

Berberidœrum Japoniœ Conspectus. In the Journal of the Linnæan Society, Vol. xxii., pp. 422-437, Tokutaro Ito presents an arrangement of the Japanese Berberidaceæ. *Caulophyllum thalictroides*, Michx., appears to be as abundant in Japan as here; the presence of *Podophyllum peltatum*, L., is not satisfactorily authenticated, though another species (*P. Japonicum*, T. Ito) is found; the Japanese *Achlys* is referred to *A. triphylla*, D C., var. *Japonica*, Ito, and a beautiful plate of it is given.

On the Differentiation of the Tissues in Fungi. Mr. George Massee, in the Journal of the Royal Microscopical Society for April, 1887, describes and illustrates the structure of several Hymenomycetes. He finds in several species of *Polyporus* a well-marked mechanical sheath in the stipe, about half a line in thickness, composed of densely matted hyphæ with extremely thick walls. This mechanical support is expanded in the pileus to form a number of branched radiating ribs. The latex tubes of *Lactarius* and *Russula* are described, and the conclusion reached that this tissue is undoubtedly connected with nutrition, in the transportation of food material, as glycogen. The cystidia met with in the hymenium are regarded by Mr. Massee as only the ends of latex tubes.

Karl Theodor Mohr. A biographical notice of this eminent botanist is published in the Pharmaceutische Rundschau, Feb , 1887.

Solanum Carolinense. L. I have a specimen of it in my herbarium collected at Flatbush, Long Island, July 28th, 1865, by the late Wm. H. Leggett. E. S. MILLER, Wading River.

Diatom Slides. It may be of interest to some of our readers who are interested in diatoms, to know that Miss M. A. Booth, of Longmeadow, Mass., makes a specialty of preparing microscopical slides of named species as well as of general deposits. These slides are well-mounted and reliably named, and those who are seeking certain species to complete collections will do well to send for her list. C. H. K.

At the Annual Reception of the Am. Museum of Nat. Hist., held Tuesday, May 10th, there were placed on exhibition a series of the nests, eggs, and mounted specimens of American birds. Botanically, the mounting is exceedingly interesting, for all the details of the surroundings are so truthfully reproduced that it is possible to give the specific names of the plants which are imitated, so naturally are they made. The lady who did this work is Mrs. Mogridge, who has done the modeling of flowers for South Kensington Museum, and whose services have been secured for the Nat. Hist. Museum by the liberality of Mrs. Robert L. Stuart. All lovers of nature and art should see these cases of American birds.

Proceedings of the Club.

The regular monthly meeting was held May 10th, the President in the Chair, and twenty-five persons present.

Dr. V. Harvard, U. S. A., Rev. R. E. Schuh, and Mr. W. R. Mitchell were elected active members.

Mrs. Mogridge, British Museum of Natural History, Miss Lydia Shattuck, South Hadley, Mass., and R. S. Williams, of Great Falls, Montana, were elected corresponding members.

The Herbarium Committee was requested to prepare a list of the rarer and more interesting plants of the vicinity, to be collected and distributed to the members of the Botanical Club of the American Association for the Advancement of Science during the coming meeting in New York, in August, and it was resolved to invite the members of the Botanical Section of the Academy of Natural Sciences of Philadelphia to participate in the excursion to Tom's River, N. J , May 28th to 30th.

Mrs. Britton exhibited specimens of *Asplenium dentatum*, *A. myriophyllum*, and *A. rhizophyllum*, var. *Biscaynianum*, collected in Florida by Mr. Isaac Holden, and distributed specimens of *Buxbaumia aphylla*, collected by Dr. Chapin at Springfield, Mass.

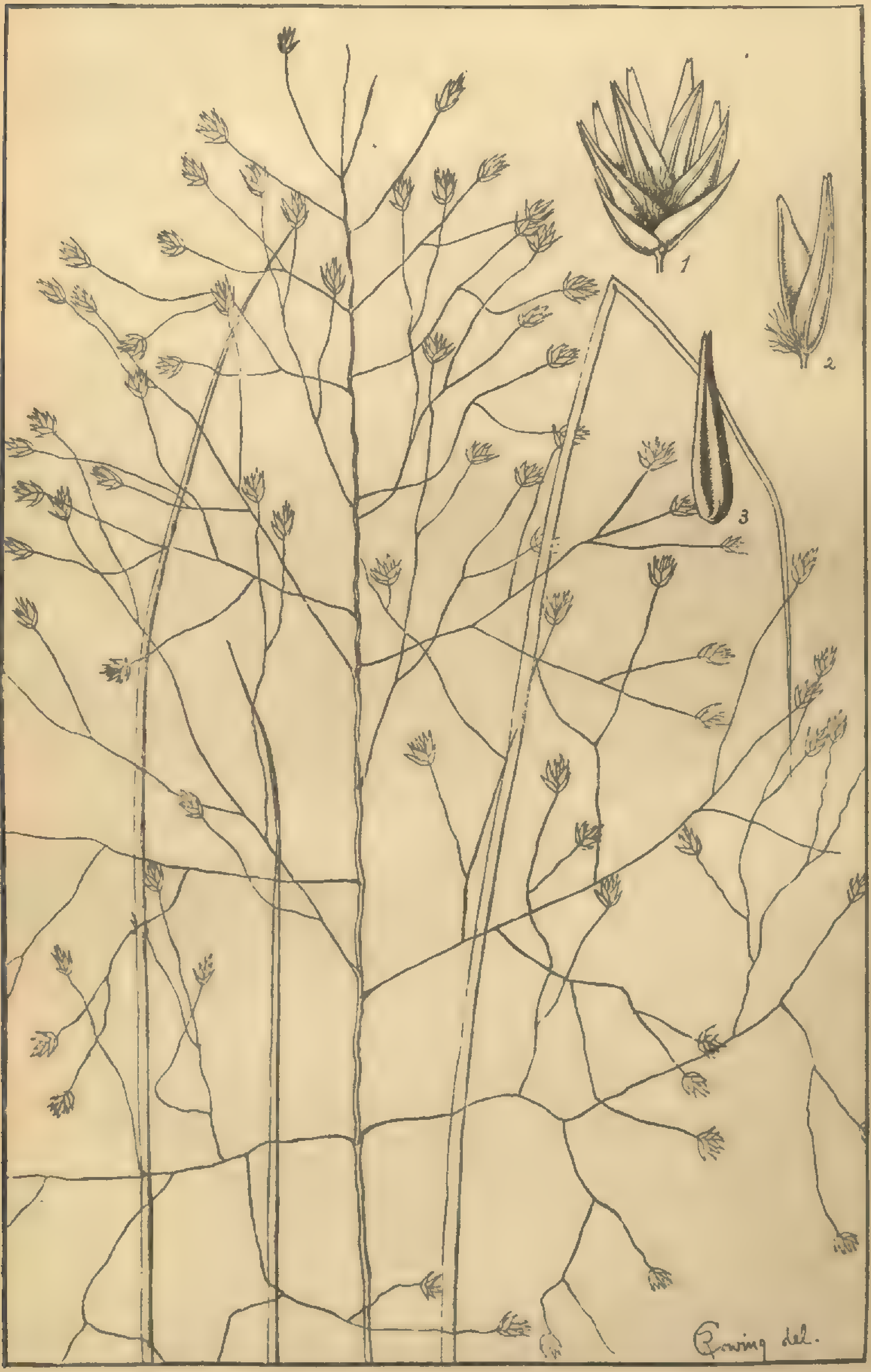
Mr. E. E. Sterns read a paper on "Some Abnormal Forms of *Saxifraga Virginiensis*," and exhibited a large number of other fresh plants in flower.

Dr. N. L. Britton described the flowers of *Populus heterophylla* and distributed staminate and pistillate catkins.

PROCEEDINGS OF THE HISTOLOGIC AND CRYPTOGAMIC SECTION, April 26th.—Miss E. Robertson exhibited some slides of the leaf and root of *Sparganium* showing stellate parenchyma in the leaf; also cross-sections of the stem of *Galium asprellum* with collenchyma on the angles, each angle terminating in a single-hooked cell. Mr. Northrop showed sections of the wood from the plumose growth of *Taxodium distichum* exhibited at the last meeting.

Two slides showing water-pores of strawberry and Cyclamen were exhibited from Mrs. Winthrop Cowdin's collection.

May 24th. J. I. Northrop exhibited sporidia of *Gymnosporangium macropus*, and specimens of *Hydrodictyon* and *Nitella* from Clove Lake brook, Staten Island, collected May 2d. Miss Jarrett examined pollens found floating in green masses from the same locality. Mrs. Britton showed active antherozoids of *Aulacomnion palustre*, each in most violent motion within the walls of their mother-cells, yet none of them were found free, though many of the cell-walls were torn so that there remained less than one-half of their circumference. Mr. Edgar J. Wright exhibited photo-micrographs of Diatoms and Desmids, pollens, wood-sections and pine-needles, and distributed some of them to the members present.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Redfieldia flexuosa, Vasey.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XIV.] New York, July, 1887. [No. 7.

Redfieldia, a new Genus of Grasses.

BY DR. GEO. VASEY.

Plate LXX.

REDFIELDIA FLEXUOSA.—Culms smooth, flexuous, 1½ to 3 feet high, from a strong creeping rhizoma (apparently growing in deep sand); leaves 1 to 1½ feet long, or more, mostly near the base, rigid, slender, smooth, involute and equaling or nearly equaling the culm, the sheaths longer than the internodes; ligule a short, hairy ring. Panicle elongated, lax, half or more than half the length of the culm, with distant, alternate spreading branches, naked below, the lower ones 4 to 6 inches long, gradually shorter upwards, the sparse filiform branchlets and pedicels divergent and few-flowered, pedicels ¾ inch to 1 inch or more in length. Spikelets ovate, compressed, 2 to 2½ lines long, three to five-flowered, the flowers crowded, the base and the short rhachilla beset with long or short white hairs. Empty glumes about half the length of the spikelet, ovate-lanceolate, acute, one-nerved, thinner than the flowering glumes, the lower 1 line long, the upper a little longer and broader. Flowering glumes 1½ to 2 lines long, compressed, thickish and rather rigid, acute or short-mucronate, or erose-denticulate, ovate-lanceolate, wide below, tapering above, smoothish or minutely scabrous, three-nerved, the midrib curved, the lateral nerves prominent and midway to the margin, the base somewhat pubescent. Palet equaling or longer than its glume, of nearly the same texture, acute, bidentate, folded lengthwise in the middle and with the two keels prominently folded in the opposite direction.

This grass was first described in 1863, by Prof. Geo. Thurber, in the Proceedings of the Philadelphia Academy of Natural Sciences, from specimens collected by Hall and Harbour in 1862. The locality is not recorded, but the ticket says: "American Plains Flora." Professor Thurber doubtfully referred the grass to *Graphephorum*, which it only resembles in the hairy rhachilla.

It has been thought to be a *Triodia*, but it differs widely from any American species of that genus, in the compressed, *not* rounded flowering glumes, *not* three-lobed or three-toothed, in the lateral nerves *not* hairy, and *not* near the margin, in the shorter, nerveless empty glumes, the hairy rhachilla the crowded flowers, and in the middle fold of the narrow palet.

It is hard to fix the relationship of this grass, but in the structure of the flowers it seems to come nearest to *Festuca*, from which it differs in the flowers crowded on the rhachilla, in the one-nerved empty glumes, in the pointed or conical flowering glumes, not rounded on the back and only three-nerved.

It appears to have been first collected by Bigelow on the Canadian River, and later (in 1873), by Messrs. Rothrock and Wolf, near Ft. Garland, Colorado. I name it for Mr. J. H. Redfield, the genial curator of the Herbarium of the Philadelphia Academy of Natural Sciences.

Note on a new North American Lichen.

DERMATISCUM PORCELANUM, Nyl., n. sp. In the supplement to my "Introduction," etc., I ventured to describe a singular plant from South Carolina as *Buellia Catawbensis*. Had I known that the plant had been sent to Dr. Nylander, before that sheet was printed, I should have withheld it. Dr. Nylander, in a letter to Prof. A. H. Green, who sent him specimens, gives the plant the name at the head of this article. *Dermatiscum* is a genus founded upon *Endocarpon Thunbergii*, Ach. Syn., p. 101, a South African lichen. It is placed by Nylander, in his Synopsis among the Lecanorei, just before *Urceolaria*.

The description of *Endocarpon Thunbergii*, Ach., is: "Thallo crasso crustaceo-cartilagineo foliaceo orbiculari-repando peltato flavo-viridi subtus nudo nigro-fusco; ostiolis demum subglobosis atris." This, so far as the thallus is concerned, applies closely to our plant, excepting as regards color. But Acharius appears to have mistaken the character of the fruit. A description of the genus was given by Nylander in Mohl & de Bary's Bot. Zeit., 1867, p. 133. I have not seen it. *Umbilicaria flavo-virescens*, Leight., in Journn. Linn. Soc., 1869, pp. 33-35, is a synonym of the African plant. H. WILLEY.

A new Genus in Cyperaceæ.

By S. HART WRIGHT.

WEBSTERIA, GEN. NOV.—Spikes one-flowered, ovate-lanceolate, pedicelate, umbellate. Peduncles umbellate. Culms terete, wiry, stramineous, flexuous, slender, smooth, repeatedly umbellately branching. Culms, branches, peduncles, pedicels and leaves sheathed. Glumes two only, the nearly opposite lower one empty, and somewhat shorter. Style one, bifid two-thirds of its length, and plumose on the bifurcations, as long as the glumes. Achenia ovate, olive-colored, or brown, minutely pitted in finely striate lines, compressed, rostrate with the persistent cylindrical base of the style—not tuberculate. Stamens three, with the anthers longer than the filaments. Setæ tortuous, six to ten, often seven, barbed downward, unequal, longer than the nut, and nearly white. Named for Mr. Geo. W. Webster, an active botanist in Florida.

WEBSTERIA LIMNOPHILA, SP. NOV.—Plant growing entirely under water. Culm 1 to 3 feet long, the internodes on the culm and branches 3 to 10 inches apart, having long tubular sheaths, ending with an awl-shaped bract. Culm and leaves faintly knotted, as if by internal cross-partitions. Leaves capillary, smooth, 1 to 2 inches long, sheathed at base, and in umbellate clusters, terminating the umbellate peduncles and branches. Pedicels umbellate, ¼ to 1 inch long, sheathed nearly the whole length. Peduncles umbellate, unequal, 1 to 2 inches long, sheathed. Glumes ⅓ to ½ of an inch long, attenuated at apex, the lower one three-veined inside, empty, the fertile glume one-veined, both with reddish-brown margins. Involucral leaves few, 1 to 3 inches long, 1-10th inch wide, soon decaying. Roots fibrous, growing in muddy bottoms of shallow lakes, the culms ascending obliquely in the water. Volusia County, Florida, May.

Observations: It may seem anomalous that a cyperaceous plant should be wholly and habitually aquatic, as this is. I discovered it in December, 1886, in a lake two miles S. E. of the village of Lake Helen, in Volusia Co., Florida, not being in fruit. Mr. G. W. Webster found it in fruit in April and May, and in several lakes. The genus is probably in the subtribe Cypereæ, and near *Dulichium.* PENN YAN, N. Y., June 1, 1887.

Bibliographical Notes on well known Plants.—I.

BY EDWARD L. GREENE.

LINNÆA BOREALIS, Linn. Spec. Pl., 631.

Beginners in botanical study are content with knowing that this or that species is called by a certain double name, as for example, *Linnæa borealis.* More advanced students in systematic botany become aware of the existence of such rather troublesome affairs as synonyms; or, that very many well-known species have been placed under one generic name by one author, and under another by another author, until many of them have as many generic names as they have petals or stamens. At this stage of his progress the learner's eyes are opened to see the advantage, if not indeed the necessity, of appending to that binary name of a plant which is adopted, the name of the author of that name.

But to the professional botanist synonyms are not altogether an annoyance. That our little rue anemone, which Linnæus called *Anemone thalictroides*, received three other generic names within much less than a century after Linnæus, is a fact very significant and instructive. And that large class of facts of which this is but a ready example, indicates, first: that the system of botanical classification which has been in slow process of evolution since centuries before Linnæus even, is still very far from perfect; and secondly, each different generic place which any species may have been assigned to, becomes valuable as an expression of the individual opinion of the author who placed it there, regarding its affinities and its place in the system of plants. Therefore any treatise upon even local systematic botany which fails to present a full synonmy, however useful it may be to beginners, is unsatisfactory to the thorough botanist; for he desires to know not only what the present writer thinks, but what others have thought about the species.

The beautiful *Linnæa borealis*, whose book-history I have chosen here to remark upon, has no long list of synonyms to be appended to it. And yet this plant was well known to botanists for more than a hundred years before Linnæus, but by a very different name from this, which was given to it in the middle of the last century. It was first named, described and figured by Casper Bauhin in his Prodromus Theatri Botanici, published in the year 1620; and the binary name which he gave it was *Campanula serpillifolia.*

We have all, in our earlier days, been gravely told by learned instructors that before Linnæus there was no such thing as a binomial nomenclature; that the earlier writers gave to each species a descriptive phrase, short or long, which served the double purpose of a name and a definition of the species. There was a good deal of truth in that statement, and nearly as much falsity in it, too. Bauhin's works, no less than those of his contemporaries, and even of authors a century earlier, fairly abound in these double names, followed by full and often very accurate specific characters. Very numerous, indeed, are the binary names now in use, and credited to Linnæus, which were in honest truth given to those species by even Bock or by Dodoens two hundred years before the splendid appearing of that Northern Light. So in the case of the earliest publication of the plant before us. Bauhin's scholarly page is headed by a very tolerable wood-cut representing it entire, from root to flower. Then comes the name *Campanula serpillifolia*, followed by a complete description in some fifteen lines, or, to be precise, of ninety-seven Latin words; then, just as any careful and appreciative author of a new species in our own time would do, he tells all he knows concerning its habitat: "A branch of this plant I had first from my brother;* afterwards we collected it in flower on Monte Baldo; then M. Paschal, the Frenchman, obtained it growing on rocks in the Tyrol." Nor does he conclude this charming account without appending a final paragraph, evidently relating to some different plant, but which, for its curiosity, I cannot forbear translating here: "A similar plant, with leaves whitish beneath and pale green above, native of the island of Toupinambo, in Brazil, Burserus has communicated to me."

So much for the original discovery, naming and publishing of one of the loveliest plants of the northern hemisphere; and under this name the plant was taken up by a number of Bauhin's botanical successors; for example: Ray (1686), Tournefort (1700), Scheuchzer (1703); but there was not a universal consensus of opinion that it had been correctly referred to the genus

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* The celebrated Johann Bauhin, no doubt.

Campanula, and Bartholini (1673), Petiver (1695), Plukenet (1696), and several other eminent authorities of the time, placed it in what is now known as *Lysimachia*, then called *Nummularia;* and with this class of botanical opinionists it stood as *Nummularia Norvegica*, the plant having been re-discovered in Norway, where it is abundant.

And so the fate of being placed by some authors in one genus, and by others in another, which has befallen so great a number of generic types in later times, befell *Linnæa*, too, in its earlier days; nor was Gronovius the first to found a new genus upon it; neither was *Linnæa* its first proper generic name, for as early as the year 1728, while the boy Linnæus was in the beginning of his college course at Lund, Buxbaum, of St. Petersburg, published it as a new genus under the name (not well formed for a generic one), *Serpyllifolia*. Then again, eight years later, Siegesbeck reasserted its generic rank, and named it, very appropriately, *Obolaria*, and this was the year preceding the appearance of the third generic name, *Linnæa*, which now holds.

It may be presumed that the genius of the illustrious Swede had recognized the fitness of the plant for a clear and strong generic type, and that his own good taste and rising ambition had combined to kindle within him a desire to have it go down to future ages under the name of *Linnæa*, and that his friend Gronovius was found ready and glad to assume the office of sponsorship. At all events, in Linnæus' Genera Plantarum (1737), the name appears, and he gives Gronovius credit for the authorship, although that author never otherwise published it. Linnæus always used almost absolute freedom with generic names which had been in use before him, rejecting many, and making new applications of many more. The first one which had been proposed for the genus in question he, with reason, put aside. The second, namely, *Obolaria*, he applied to the little North American gentianaceous plant which still bears the name.

With regard to the authority for the specific name, or, if you like, the whole binary name of this plant, our American books every one, in so far as I have observed, and those of many and distinguished European authors also, are at fault in reading as they do *Linnæa borealis*, Gronovius. Gronovius named the genus, but he did not name the species; that was done by Linnæus, who so designated it in the first edition of the Species Plantarum; and he always cited Gronovius for *Linnæa*, and himself for *Linnæa borealis*; but among later authors of acknowledged erudition, a majority commit the error named. I cannot find the shadow of a fact in all the range of the earlier bibliography to excuse it.

I would remark, finally, that Linnæus, in first publishing the species, cites faithfully *Campanula serpillifolia*, Bauhin, as the oldest synonym, and it was by this name that he must have known the plant from those days of his youth when he began the studies which were to culminate in making him the great Nomenclator.

Some Morphological Notes on Caulophyllum thalictroides.

Dr. Asa Gray, in his Manual, describes the genus *Caulophyllum* as "sending up in early spring a simple and naked stem, terminated by a small raceme or panicle of yellowish-green flowers, and, a little below, bearing a large triternately compound leaf, without any common petiole," And under the specific description of *C. thalictroides*, Michx., he adds: "a smaller biternate leaf often at the base of the panicle." This plant is quite common in Ohio, and the smaller leaf here referred to seems to be a constant feature; even a third leaf is occasionally added. It is also not uncommon to see the lowest leaf with a common petiole nine or ten millimetres in length, and the smallest leaf divided once ternately, with only the middle lobe divided ternately again. The inflorescence may be characterized as consisting of a terminal panicle with a smaller panicle or raceme a slight distance below the same in the axil of the smallest leaf. It is not rare to find a third small panicle or raceme in the axil of the larger leaf, or even in the axil of all three leaves if they are developed. The existence of these forms does not indicate that our learned author has been caught napping, but serves to show that great variations exist which cannot always be taken into account in a condensed work intended for the school-room. But they may also serve to show another and perhaps more important truth. Many students of botany believe that plants did not always exist in the form in which they are now found. Their ancestors would have been defined as distinct species. Now, our early spring flowers seem to differ from their ancestors usually in producing fewer leaves and a shorter stem; these, together with the flower-buds of next year, are already stored away by fall in underground buds, ready to come up at the first flush of spring and blossom long before the surrounding vegetation has managed to unfold its leaves and to get strength enough to produce blossoms. In some plants, as in *Sanguinaria Canadensis*, L. the plants are content to produce only one flower on each stem, and in order to further assist in its rapid blossoming, this single flower almost always terminates the stem, thus securing the first flow of sap, and incidentally giving rise to sympodial growth. Such plants frequently produce flowers before the leaves have been even moderately developed. Sympodial growth is also frequent among plants possessing a compound inflorescence, although here its immediate use is not always so evident. In *Symplocarpus foetidus*, Salisb., where this sympodial structure may be only theoretically followed, the advantage may well be doubted. Spring flowers, therefore, by the decrease of the number of their leaves and also often by the reduction of the number of flowers to be produced, have made it possible to prepare the parts necessary for next year's growth during the previous autumn and then to develop them rapidly in the spring.* But they are continually giving signs of their origin by producing more leaves, as in *Podophyllum peltatum*, L. †, or by producing a greater number of flowers or even a compound inflorescence, as in *Sanguinaria Canadensis*, L. ‡, or by increasing the number of both, as in *Caulophyllum*. When we consider, however, that their present state is in reality the abnormal one, it does not appear so strange that reversion to the old types should take place, and usually it takes only patience and a great number of specimens to detect such cases of reversion. Often they become so frequent as to attract no attention and are then included in the specific description of the plant.

AUG. F. FOERSTE.

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* The Hibernacula of Herbs. Am. Nat., Nov., 1883.

† The May Apple. Bull. Torrey Bot. Club, June, 1884.

‡ Notes on *Sanguinaria Canadensis*. Bull. Torrey Bot. Club, April, 1887.

Notes on Diatoms.

We have received from Dr. Geo. H. Taylor, of Mobile, a very interesting gathering of marine diatoms from Tampa Bay, Florida. The following is a list of the species which it contains:

Actinoptychus splendens, Shadbolt.
A. undulatus, Ehr.
Amphiprora elegans, W. Sm.
Auliscus pruinosus, Bailey.
A. cælatus, Bailey.
Biddulphia pulchella, Gray. Rare.
B. rhombus, W. Sm.
Campylodiscus cribrosus, W. Sm.
Eupodiscus Argus, Ehr.
E. radiatus, Bailey.
Melosira sulcata, Kutz. (=*Orthosira marina.*)
Navicula Lyra, Ehr.
N. permagna, Edwards.
Rhabdonema arcuatum, Kutz. Rare.
Stauroneis aspera, Kutz.
Surirella Febigerii, Lewis.
Triceratium favus, Ehr.
T. scitulum, Bright. (=*var. of T. favus.*)
T. spinosum, Bailey. Rare.
Tryblionella scutellum, W. Sm. (=*Nitzschia circumsuta.*)
Terpsinöe musica, Ehr.

Dr. Taylor's letter will doubtless interest many of our readers.

[C. H. K.]

Editor of BULLETIN:

I have read with interest an article on diatoms by Mr. C. H. Kain, which appeared in the February number of your journal. The article is valuable from the fact that Mr. Kain relates his experience in the actual field of investigation, and speaks only of what he has accomplished. Mr. Kain unfortunately cautions the avoidance of muds in the collection of diatoms. In this I do not agree with him, for, if we avoid the muds, we are cut off from some of the finest specimens that are easily obtainable by all, whether they reside near the coast or thousands of miles from it. I am now engaged in working up the muds of the North Carolina coast. I must depend entirely upon others for the raw material. My plan of operation is to order the muds from the deep water where vessels are anchored. When this is received and examined, I order again from different locations where oysters abound, for it is a well-known fact that the oyster muds always contain many beautiful forms. On the Gulf coast there are three classes of muds—blue, black and gray. I always select the blue muds. In Tampa Bay, Florida, the bottom is composed of three distinct classes of marine and vegetable matter. There is a white marl, a black mud and a blue mud. As a rule it is only the blue mud that is productive. I have often read with surprise the remarks of eminent diatomists on the avoidance of marine muds. I am now offering a cleaning from Tampa Bay, which I challenge the world to duplicate from the same material. Those who receive it will find it to contain beautiful specimens of *Auliscus pruinosus*, *Auliscus cœlatus*, *Triceratium favus*, *Nitzschia circumsuta*, *Eupodiscus radiatus*, *Eupodiscus Argus*, *Orthosira marina*, *Amphiprora elegans*, *Terpsinöe musica* and *Surirella Febigerii.*

The mud from which these vigorous forms are obtained is one of the most difficult to clean, that is to eliminate the sand, of any on the Gulf coast. The result obtained, however, more than pays for the labor expended. In cleaning these muds I have used as much as two hundred and fifty gallons of water before I obtained enough material, in a cleaned state, to cover the bottom of a half-drachm phial. I have now on hand a specimen of this kind from Apalachicola Bay, which took three gallons of mud and the above named quantity of water to thoroughly wash before the application of acid. The great mistake generally made in cleaning marine muds is that not enough care is taken in the first washings with water. My method is to remove all sand possible before shaking is commenced, for the violent agitation of a mixture of sand and diatoms is very apt to break some of the most beautiful forms in the deposit. Another mistake made in cleaning diatoms is by placing too large a quantity of the raw material in the vessel for the first washing. Only as much should be placed in the bottle or jar as will settle in ten minutes, and this should be repeatedly washed until the water will settle clear in a few minutes. The jar should not be shaken, but rotated, and the sand removed after each settling. If this is followed out faithfully there will be very little trouble encountered when the time comes to apply the acid.

I am offering to send cleaned material from Tampa Bay to any who send me their address, and will allow them to place their own value upon it. I make this offer in order to assist me in procuring material from the Atlantic coast, which I am now about to work up. I shall send the result of this work to diatomists all over the country, through Messrs. Queen & Co., of Philadelphia, free to all who apply for it.

Respectfully yours,

GEO. H. TAYLOR.

A supposed new Genus of Anacardiaceæ from Bolivia.

By N. L. BRITTON.

SYCOCARPUS. Calyx four-toothed; corolla coriaceous, gamopetalous in the bud; stamens eight; anthers oblong, sessile near the summit of a campanulate disc; pistil one; ovary four-celled, pubescent; style short, also pubescent; stigma peltate, its flat top marked by four indistinct grooves; fruit shaped like a young fig, dry and crustaceous, indehiscent, imperfectly four celled, containing one or two erect seeds, laterally attached to an axillary placenta. Mature flowers not seen.

S. RUSBYI. Leaves imparripinnate, 5 to 7 dm. long by 3 to 4 dm. wide, broadly oblong in outline; leaflets opposite, of from five to ten pairs, short petioled, oblong, somewhat obtuse at each end, entire, 15 to 20 cm. long by 5 to 6 cm. wide, smooth on both sides when mature; racemes appearing in the axils of the leaves, once compound, loosely flowered, 25 to 30 cm. long by 5 to 10 cm. wide at the base; flowers nearly sessile; fruit brown, 12 to 18 mm. long when mature, pubescent when young, but soon becoming glabrous.

A tree of some 12 metres in height, broadly branching from near the base, reaching an extreme trunk diameter of nearly one metre, the ultimate branches erect; wood rather soft, covered with a thick ash-colored bark, which becomes rough only in age; leaves erect-clustered at the ends of the branches.

Collected in Bolivia by Dr. H. H. Rusby, May, 1886.

The Flora of Banda Oriental.

By W. E. Safford, U. S. N.

After a passage of sixty-six days from New York, the "Vandalia" came to anchor in the roadstead of Montevideo, about two miles from the city.

From our anchorage we could see a compact mass of flat-roofed houses rising gradually from the water's edge and crowned by a large cathedral with two spires and a dome of glazed tiles. To the west of the city was a little harbor crowded with ships of all nationalities, beyond which rose the "mount," or *cerro*, which gives to the city its name. To the eastward we could see a broad expanse of pasture land, dotted with herds of cattle and sheep, and in the distance a number of trees darkly outlined against the horizon. All of these, I afterwards found, were introduced species: Eucalypti and Acacias from Australia, tall, slender "Lombardy" poplars, and weeping willows. Very few of the trees indigenous to the region are suitable for shade trees. They are mostly of small size, and their leaves are of such a nature as to offer but little protection from the sun, narrow and coriaceous, and thus admirably adapted to resist the violent winds which blow almost continually over the unprotected plains.

It was a great pleasure to get on shore after having been confined so long on board ship. Spring had just begun. The broad, flat country around Montevideo was covered by a rich carpet of tender grass spangled with flowers. The pretty quintas were surrounded by bouquets of blooming quince and cherry and apple trees, contrasting strangely with the dark, glossy-leaved limes and oranges and the feathery palm trees by their side. For Montevideo, although in a latitude corresponding nearly to the southern boundary of Tennessee, has a very mild climate. In the summer time the temperature seldom reaches above ninety degrees Fahrenheit, and in winter frost is of rare occurrence; so that Fuchsias, Heliotropes and beautiful Cape Jasmines grow to an enormous size.

To those who have read Darwin's Journal, the Banda Oriental, or, as it is now called, the Republica Oriental, must have almost classic interest. I was eager to wander over the *campo* of whose flora Darwin gives us but a tantalizing glimpse when he mentions the brilliant scarlet Verbenas and the daisy-like flowers, in his description of the country around Maldonado, a region to the eastward of Montevideo. I wished to see the *Ombu* trees which he describes as so characteristic of the Pampas, and the thistles which grow to such an enormous size as to afford hiding-places for robbers. All of these I saw during our stay at Montevideo, and I was able to make almost a complete collection of the spring plants and trees of the region, nearly all of which were determined for me by Don José Arechavaleta, of Montevideo, who has in his possession the Gibert collection of Montevidean plants. I am also greatly indebted to this gentleman for several delightful botanical excursions to the interior of the country in the province of Comelones, and for his kindness in allowing me access to his herbarium.

I wish to remark here, that although Montevideo has many excellent bookstores, in which I found the works of nearly all the modern writers on natural science, I failed to discover a single book which treated of the natural history of the Banda Oriental or of South America, except translations in French and Spanish of Darwin's Journal. I was informed by a gentleman in Montevideo that the accuracy with which this work describes the country is remarkable, and I found that nearly every well-educated man whom I met was familiar with it.

The only thing which I could find bearing upon the botany the region was a catalogue of the Gibert collection of plants in the Kew Herbarium, a copy of which was kindly given me by Mr. Arechavaleta. This gentleman informed me that no manual of the Uruguayan flora has ever been published, and that, in fact, certain genera and even families of plants of the region have not yet been worked up. Among them are the Bromeliaceæ, the Orchidaceæ, the many species of *Plantago*, *Oxalis* and of *Sisyrinchium*. He has been paying special attention for a number of years to the Compositæ, has collected and described many fresh-water algæ, and is now engaged in working up the Gramineæ.

In the immediate vicinity of Montevideo I noticed many hedges of Agave, cactus and a species of dwarf *Pandanus*, enclosing fresh-looking vegetable gardens and orchards of quinces, figs and oranges. In many places these hedges are being extirpated, and replaced by wire fences. The wire used is not armed with the dangerous barbs so common in the United States. The posts are either of imported timber or they are made of the trunks of the Ñomdubay tree, one of the Leguminoseæ, which seems to have the same properties as our locusts (Robiniæ) when buried in the ground.

One of my first tramps was to the eastward of the city in the direction of Punta Carretas. Not a tree or shrub was to be seen. The rich green sward was dotted by whitish clumps of thistles and the wild cardoon and bright patches of pink and yellow oxalis. Many of the flowers common in our gardens were here growing indigenously—beautiful Verbenas, white and crimson Petunias, pretty purple Mallows and spiny Solanums with large conspicuous flowers. I collected a number of species of *Sisyrinchium*, or blue-eyed grass, varying in height from two feet to delicate little plants of a few inches only, with almost microscopic flowers. These were especially interesting to me, as we have but one Sisyrinchium (*S. angustifolium*) in the northeastern United States.

Among the other plants in the fields were large woolly-leaved Senecios, with conspicuous yellow flowers; a little *Antennaria* or *Gnaphalium* like the common plantain-leaved "everlasting" of our fields; an indigenous clover with tiny leaves and loose heads of pretty tawny flowers, besides many species of *Medicago*, which have probably been introduced. Among the daisy-like composites were a dwarf *Erigeron* and a species of *Anthemis* with pretty white flowers, growing in large patches. It may be this plant which Darwin, in his Journal, says reminded him of the daisies of the English fields.

The rocks of the sea coast were devoid of any vestiges of Algæ. This, I think, may be explained by the great amount of mud held in suspension by the water, the irregularity of the tides, which frequently leave the rocks exposed for a long period of time, and the variability in the saltness of the water.

In the sand of the beach I found a little African composite with fleshy leaves and small rayless heads of flowers, the *Cotula coronopifolia*, L., now so extensively spread throughout the world.

On my way back to the city I stopped to gather flowers by the roadside, under hedges and in the neighboring fields. A pretty little fumitory (*Fumaria capreolata*, L.) climbed along a hedge, under the shade of which a simply pinnate fern (*Blechnum australe*, L.) grew in abundance.

In the fields near the road, and in waste places, I was surprised to find many familiar plants, which grow in similar situations in the United States. Most of these were European species which are adventitious with us or which have escaped from cultivation. The bright little scarlet pimpernel (*Anagallis arvensis*) greeted me as an old friend. With it were associated the common shepherds-purse, *Samolus Valerandi*, *Cerastium vulgatum*, *Sagina procumbens*, *Lepigonum medium*, Fries., *Spergula arvensis*, *Portulaca oleracea*, several species of *Medicago*, *Centunculus minimus*, *Veronica agrestis* and *Veronica arvensis*. In an old vacant lot I found a rank growth of weeds, some of which have established themselves in many parts of the world. Among them were several species of *Chenopodium* and *Rumex*, the common bur-dock, *Datura Stramonium*, *Marrubium vulgare*, the deadly night-shade, *Stellaria media*, Herb Robert, wild carrots and radishes, *Conium maculatum*, *Maruta Cotula*, DC., chicory, the sow-thistle, *Plantago major*, and a tangled mass of *Galium Aparine*, *Mikania scandens* and the common bird-weed of the fields.

In looking over Don José's herbarium I was much impressed with the scarcity of Ranunculaceæ. The whole order was there represented by nine species—two species of *Clematis*, one *Anemone*, two *Ranunculi*, one *Aphanostemma*, and three species of *Casalea*. In the United States and in Europe the Ranunculaceæ comprise some of the most beautiful and characteristic species of the flora; in the Banda Oriental none of them are conspicuous.

I had the pleasure of going on two botanical excursions with Don José—to Independencia, or La Paz, where I made almost a complete collection of the spring flowers of the fields, and to an estancia near the town of Santa Lucia, where I collected specimens of many of the indigenous trees of the country. Both of these localities are in the Province of Comelones, and are situated on the Central Uruguayan Railroad. From the car windows we could see large fields of wheat, well kept vineyards, and orchards of peaches; and from time to time we passed large Ombu trees. It may be interesting to note that the Ombu (*Phytolacca dioica*) belongs to the same genus as the common poke-weed (*Phytolacca decandra*). It is a handsome tree with dense foliage, large dark-green elliptical leaves, and a swollen buttressed trunk. It is said that its berries are sometimes used for coloring wine. Its wood is soft and almost of herbaceous consistency, so that it is unfit for purposes of construction, or even for burning. Its vitality is great; I saw several young trees growing from the margins of stumps of old ones which had been cut down. In describing to me the softness of the wood, one of my acquaintances in Montevideo said: "You could cut an Ombu down with a knife, as though it were of butter."

At Independencia the railroad embankments were covered with patches of purple Verbenas, yellow Senecios, blue Lupines, and the daisy-like *Anthemis arvensis*. We saw also quantities of a little European *Silene* (*S. Gallica*, L.) and the common *Echium violaceum*. In a little valley near an outcrop of Syenite, I collected a delicate "golden" fern (*Gymnogramme chærophylla*, Desv.), and the rank *Blechnum australe*, L. The rocks were covered with mosses, among which were a *Grimmia* and a *Campylopus*. Near by, in a damp place, I found *Ranunculus muricatus*, an odd-looking *Plantago*, and two or three species of *Oxalis*, one of which had handsome yellow flowers and thick substantial hairy leaves growing on a long trailing stem.

Near the Arroya de las Piedras, I gathered some beautiful grasses, among which were *Melica papilionacea*, L., bearing large pendant glumes like May-flies clinging to the stem; *Calotheca elegans*, Beauv.; and the tiny introduced *Briza minor*, L. Suddenly we came upon a patch of dazzling scarlet which seemed to be intensified by the bright green of the grass around it. It was the *Verbena chamædrifolia*, Juss. (= *V. Melindres*, Gill.), a plant which gave me more pleasure, I think, than anything else I have ever collected. I collected the only indigenous Anemone (*A. triternata*, Vahl.) thus far known from the region. It looked somewhat like a diminutive *A. Virginiana*, L., and had nearly gone out of bloom. It was associated with a tiny umbelliferous plant with a bulbous root deep under the surface, somewhat like the *Erigenia bulbosa* of the middle United States. This little plant is probably the earliest of the region to bloom (excepting the chick-weeds and other plants which never cease blooming). For the Republica Oriental has a well-marked spring season, however mild its winters may be.

(*To be continued.*)

Another Florida Fern.

On the south bank of the Miami River, a short distance below the rapids, I collected, on the first of March of this year, a fern which appears to be *Nephrolepis acuta*, Presl., not reported as having been found before in the United States. It was very abundant at that one place, though not seen elsewhere. Fruit-bearing fronds were rare at that time, and the few that were obtained were past their prime maturity. However, a few sori with indusia in good condition remain. Specimens were submitted to Prof. Eaton, and he says: "I have very little doubt that your fern is really *Nephrolepis acuta*, a somewhat rusty-pubescent variety." ISAAC HOLDEN.

[Mr. Holden's specimens were compared with those of Fendler's Plants of Trinidad, No. 55; Wright's Plantæ Cubenses, No. 1,011, and Hayes' Filices Centrali-Americanæ, No. 15, with all of which they agree in having almost circular indusia, subpeltate in the attachment.—ED.]

Index to Recent American Botanical Literature.

Aquatic Plants of the vicinity of San Diego.—C. R. Orcutt. (West. Am. Sci., iii., pp. 123-126.)

Botany of California and Parts Adjacent.—Studies in the.—VI. Edward Lee Greene. (Bull. Cal. Acad. Sci., ii., pp. 377–418; reprinted.)

Professor Greene's sixth contribution to the Botany of our West Coast, opens with "Notes on the Botany of Santa Cruz Island," giving a most interesting account of the character of the Flora and its relations to that of the other islands of our "Southwestern Archipelago," and of the mainland. He suggests that many of the rarer species of Southern California have originated on these islands and they may have formerly been connected with some other land area than America, and cites many facts which would tend to give weight to this theory.

"A Catalogue of the flowering plants and ferns of the Island of Santa Cruz" enumerates 321 species, more than 25 of which have not yet been found on the mainland. We find the following new species in this list:

Thysanocarpus ramosus; Hosackia (?) *occulta, Bigelovia venata*, var. *sedoides; Eriophyllum stœchadifolium*, Lag., var. *depressum*; *Cnicus lilacinus; Stachys acuminata* and *Typha bracteata*, the latter a giant of its kind, being 15 to 18 feet high, with staminate and pistillate spikes 12 to 16 inches long. He also makes the following changes in nomenclature:—*Cardamine integrifolia* (=*Dentaria integrifolia*, Nutt.) and *C. Nuttallii* (=*D. tenella*, Pursh.); *Arabis filifolia* (=*Cardamine filifolia*, Greene); refers the Water Cress to *Nasturtium aquaticum*, Tragus, 1552; and *Comarostaphylos diversifolia*, (=*Arctostaphylos diversifolia*, Parry.) By using the oldest specific name of three other plants he gets three additional species: *Sisymbrium pinnatum* (*Erysimum*, Walt.; *S. canescens*, Nutt.); *Plagibothrys Californicus*, (*Echidiocarya*, Gray; *P. Cooperi*, Gray); and *Distichlis spicata*, (*Uniola*, L., *D. maritima*, Raf.) We presume that this will not be acceptable to everybody, and would suggest that it would be well to have some conventional rule in the matter, which all might follow, otherwise there is sure to be an appalling conflict of authority. It appears to the writer that if we are ever to get species correctly and satisfactorily located, we must all follow the same usage. This would be a worthy subject for discussion by the botanists of the American Association.

Professor Greene's paper closes with descriptions of *Horkelia Kelloggii*, (*H. Californica*, var. *sericea*, Gray); *Horkelia Parryi*, from Amador County, and *Convolvulus Binghamiæ* from Santa Barbara.
N. L. B.

Bulletin of the Iowa Agricultural College, from the Botanical Department.—Byron D. Halsted, Professor of Botany. (Pamphlet, 8vo, pp. 66. Cedar Rapids, 1887.)

This valuable publication contains so much interesting matter that it can hardly be justly reviewed in the limited space at our command. Part I treats of work with the students, and indicates a great deal of interest on their part. The root of *Sanguinaria Canadensis* offers a very satisfactory material for the study of pigment-cells; young prothalli of Equiseta from spores germinated on moist sand, were easily obtained and proved of great interest; the pollens of several plants were critically studied; hop leaves are recommended for chlorophyll and cucumber placentæ for inulin. Part II is devoted to a record of observations and experiments by the professor, and accounts are given of the germination of Ergot (*Claviceps purpurea*, Fr.,) from *Elymus Canadensis*; the adhesive bands of *Silene antirrhina*; on the insectivorous habit of *Silphium perfoliatum*; observations on *Cnicus altissimus*; a calendar of leafing of trees and shrubs, the time of first blooming of spring and early summer plants; notes on the Peronosporæ and the Ustilagineæ; a list of Colorado Fungi collected with Dr. Bessey in Central Colorado in 1886, and many other matters of botanical and agricultural interest.

Cupressus Nutkaensis. (Garden, xxxi., p. 502.)

Epipactis latifolia.—Fertilization of.—A. D. Webster. (Bot. Gazette, xii., pp. 104–109, from Trans. and Proc. Bot. Soc. Edinburgh, xvi.)

Grasses of the South.—George Vasey. (Dept. Agric., Botanical Division, Bull. No. 3. Pamph., 8vo, pp. 63, 16 plates, Washington, 1887.)

This paper is the outcome of a circular letter sent a few months since by Commissioner Colman to residents of the South and Southwest, asking for information regarding forage plants. It is thus "a report on certain grasses and other forage plants for cultivation in the South and Southwest," and much valuable information is contained in its pages. The species illustrated are *Paspalum dilatatum*, *Panicum maximum*, *P. sanguinale* and *P. Texanum*, *Sorghum halepense*, *Phalaris intermedia*, *Sporobolus Indicus*, *Holcus lanatus*, *Arrhenatherum avenaceum*, *Cynodon Dactylon*, *Poa arachnifera*, *Bromus unioloides*, *Erodium cicutarium* (Alfilaria), *Medicago sativa*, *Lespedeza striata* and *Richardsonia scabra*.

Iris.—Our "tripetalous" Species of.—Sereno Watson. (Bot. Gazette, xii., pp. 99–101.)

An account of the confused synonomy of the *I. tripetala*, Walter, of the Southern States and the *I. Hookeri*, Penny, of Canada.

Lichens.—An Introduction to the Study of.—Henry Willey. (Pamph., 8vo, pp. 58; 10 plates. New Bedford, 1887.)

All who are interested in this peculiar class of plants will heartily welcome this work of Mr. Willey, and it must give an impetus to their study by American botanists. It contains chapters on collecting and mounting Lichens; on their structure and organs, under which heading the Schwendener theory is briefly discussed in connection with the more recent investigations of Minks, and we must confess to a certain sense of relief in reading, that "for the present and for practical purposes the Lichen remains a Lichen;" the geographical distribution of North American species is discussed and the Flora divided into six districts, (1) Arctic; (2) Alpine; (3) Atlantic; (4) Southern; (5) Western; (6) Pacific; there are also chapters on the history of Lichens, helps to the study of Lichens, and the arrangement of North American Lichens, a very convenient key to the 76 genera being given. The work is concluded by a list of published North American species, with habitats, and here the following new species are described: *Buellia Catawbensis* (see this BULLETIN, p. 134 and Bot. Gazette, xii., p. 115); *Opegrapha levidensis; Arthronia carneo-rufa*; *A. Floridana; A. erubescens; A. vernans, A. Ravenelii*, Tuckerm., ined.; *A. gregarina*; *A. melanospora*, Tuckerm.,, ined.; *A. caudata*, and *A. subcyrtodes.* The plates illustrate various phases of the structure of thallus, gonidia, apothecium, spermagones and pycnides, and the spores of all North American genera enumerated. The pamphlet is published at the low price of $1.00, and is remarkably well printed. Copies may be obtained from the author, at New Bedford, Mass.

Mertensia Virginica—How Humblebees extract Nectar from.—J. Schneck. (Bot. Gazette, xii., p. 111.)

Monotropa uniflora a Parasite?—George Baptie. (Ottawa Nat., i., pp. 40–43.)

This question was discussed at a recent meeting of the Ottawa Field Naturalist's Club, and considerable difference of opinion expressed, and the suggestion made that the Ottawa Field Naturalist's Club investigate the matter during the coming summer.

Nantucket—The Wild Flowers of.—Mrs. H. R. Luney. (Vick's Ill. Month. Mag., x., pp. 166–168.)

Nymphæa lutea in Brazoria County, Texas.—E. H. Hitching. (Bot. Gazette, xii., p. 109.)

Orchids—Hardy American. (Gard. Chron., i., 3d Series, p. 682.)

Notes on *Calypso borealis*, *Cypripedium pubescens* and *C. spectabile*, *Goodyera pubescens*, and several *Habenarias*.

Pasque Flower—Anemone Pulsatilla. (Vick's Ill. Month. Mag., x., p. 177; one cut.)

Pinus Strobus. (Garden, xxxi., p. 404; two figures.)

Sassafras officinale.—W. Goldring (Garden, xxxi., p. 449, figure.)

Scoliopus Hallii, Watson.—Thos. Howell. (Bot. Gaz., xii., p. 111.)

A description of the floral characters of this species, from plants collected by Mr. Howell at the original locality.

Staining and Mounting Plant Sections.—C. Wellington. (The Microscope, viii., pp. 133, 134.)

Weeds of Southwestern Wisconsin and Southeastern Minnesota.—L. H. Pammel. (Pamph., 8vo; pp. 20, Saint Paul. 1887.)

A list of 88 plants, more or less troublesome as weeds, "a contribution to the flora of La Crosse and vicinity."

Proceedings of the Club.

The regular monthly meeting was held on June 14th, the President in the chair, and 28 persons present.

Miss C. A. Timmerman was elected an active member, and Dr. Walter H. Chapin, of Springfield, Mass., and Miss M. A. Booth, Longmeadow, Mass., were elected corresponding members.

The Field Committee reported the following noteworthy plants detected on recent excursions: *Orchis spectabilis*, at Inwood; *Cystopteris fragilis*, near West New Brighton; *Stellaria graminea*, *Trifolium hybridum*, *Lysimachia thyrsiflora*, at Little Ferry, N. J.; *Glyceria distans* and *Polygonum ramosissimum*, at New Lots, L. I. It also reported that the excursion to Tom's River, N. J., May 28-30, in company with delegations from the Academy of Natural Sciences, of Philadelphia, had been successfully carried out and had proved an occasion of much mutual pleasure and profit.

Dr. Britton remarked on the re-discovery of *Corema Conradii*, near Cedar Bridge, N. J. The plant was observed by Mr. F. J. H. Merrill, in September last, and the locality visited after the Tom's River trip by Messrs. Thomas Hogg, Northrop and Britton, and an abundance of specimens in good fruiting condition secured.

Mr. Hollick reported the discovery by Mr. W. T. Davis of a new locality for *Clematis ochroleuca*, on a sand dune in the salt meadows near Watchogue, Staten Island.

The Committee on the Meeting of the American Association for the Advancement of Science reported progress, and an offer from the Natural Science Association of Staten Island to co-operate with the Club in the entertainment of the Botanical Club of the Association was accepted.

Mr. E. E. Sterns remarked on the gradual extinction of native plants on Manhattan Island, and exhibited a large number of living plants in flower.

Dr. Britton showed a specimen of *Pogonia affinis*, Austin, collected near Trenton by Prof. A. C. Apgar, and others of *P. verticillata*, from Staten Island, and remarked on the unsatisfactory descriptions of these plants. He also exhibited *Symplocarpus fœtidus* with two staminate spadices and a very large form or variety of *Aralia nudicaulis* with compounded leaves and inflorescence, also communicated by Prof. Apgar; also a specimen of *Sophora secundiflora*, Benth., from Texas, with fasciated inflorescence, sent by Dr. Vasey; a diminutive undescribed species of *Houstonia* (*H. Croftiæ*, Britton and Rusby), from San Diego, Texas, and read a description of a supposed new genus of Anacardiaceæ from Bolivia.

In view of the meeting of the American Association, it was resolved to hold meetings in July and August. This will bring about a meeting of the Club on the evening before the assemblage of the Association, which it is hoped all botanists will endeavor to attend.

Judge Brown spoke of the paucity of American local floras as compared with those of Europe, and said that the descriptions of the Manuals, framed as they are for a wide range of locality, are very unsatisfactory for careful distinction of species.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XIV.] **New York, August, 1887.** **[No. 8.**

The Genera Echinocystis, Megarrhiza and Echinopepon.

By Sereno Watson.

The first and for a long time the only known North American species of the American tribe of *Cucurbitaceæ* which is called by Bentham & Hooker the *Elaterieæ*, and by Cogniaux the *Cyclanthereæ* (both names proposed by Naudin and equally appropriate, but the latter the earlier), was the *Echinocystis lobata*, Torr. & Gray. This was first described by Herrmann in 1698 from plants raised in Holland from seeds which Tournefort had received from Canada. It was next noticed by Muhlenberg in his Index Floræ Lancastriensis (1793).* By Muhlenberg, as afterwards by Seringe in DeCandolle's Prodromus, it was referred to *Momordica*, and by Michaux to *Sicyos*. Its distinctness as a genus was first shown in Torr. & Gray's Flora, where the name *Echinocystis* was given to it, their previous *Hexameria* of the same year (1840) being preoccupied.

An allied plant of Oregon which had been collected by Douglas and Scouler, and referred by Hooker to the eastern *Sicyos angulatus*, was distinguished from that species by Torrey & Gray as *S. Oreganus*, the specimens being too imperfect to show its nearer affinity to *Echinocystis*. In the years 1854 and

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* It is not probable, as Cogniaux thinks, that the *Elaterium trifoliatum*, Linn., based upon Clayton's description of Virginian specimens, can be referred to this species. The description agrees better with *Sicyos angulatus*, notwithstanding the "valvulis vi elastica per maturitatem dehiscentibus." The *Echinocystis* is not known to occur in Virginia.

1855 the same plant and similar Californian species were collected by the botanists of the Pacific Railroad surveys, and specimens were submitted to Dr. Torrey for determination. Some of these species were also known to Dr. Kellogg, of San Francisco, and in March, 1855, he described one of them under the name *Marah muricatus*, noting at the same time its near relationship to *Echinocystis lobata*. In June, however, of the same year he appears to have silently discarded or to have forgotten his new genus, for he then describes another species of the "giant root" as *Echinocystis muricatus*. These publications were made in the columns of a daily newspaper. Dr. Torrey, in ignorance of this and as a result of his study of the Government collections made under Lieutenants Whipple, Parke and Williamson, referred the plants to a new genus which he called *Megarrhiza*, publishing a species (*M. Californica*) in Parke's report in 1856 and authorizing the enumeration of that species and of *M. Oregana* in Newberry's report upon Williamson's plants. The descriptions of the genus and species he delayed, intending to give them in full in connection with his report upon the collections made by Lieut. Whipple. The publication of this report, however, was not made until 1857, and in the meantime he learned through Dr. Andrews of Kellogg's genus *Marah*. Consequently, and more especially on account of the difficulty of determining, from the scarcity of the materials, whether there was really more than one species, he omitted from the report all reference to the matter, and nothing more was published by him on the subject. Nevertheless, the genus *Megarrhiza* was recognized by Dr. Gray in 1859, in his list of Xantus' Lower California plants, and in 1860, in the Botany of Ives' Report. In 1860, Naudin, of Paris, who chanced to have *Megarrhiza Californica* in cultivation, knowing nothing of its previous history, published it as *Echinocystis fabacea*. His acquaintance with the eastern *E. lobata* appears to have been slight, but seeds of that species were communicated to him by Dr. Gray, together with a knowledge of Torrey's genus *Megarrhiza*, and in 1862 he gave a description of it based upon cultivated specimens. He still was of the opinion that the two species were congeneric, "malgré la grande autorité de MM. Torrey et Gray."

In 1866 Naudin proposed the genus *Echinopepon* for several Mexican species, including one of New Mexico (*E. horridus*), which Dr. Gray had previously named *Elaterium* ? *Coulteri*). Bentham & Hooker, in their Genera Plantarum (1867), refer *Megarrhiza* to *Echinocystis* as a subgenus, and include also Naudin's *Echinopepon*, which they knew only from his description.

Dr. Torrey had in 1861 prepared a report upon the Pacific Coast plants of the Wilkes Expedition, among which were specimens of *Megarrhiza*, but when in 1873, after his death, the report was taken in hand by Dr. Gray for publication, it was found that Dr. Torrey "had left the article on this genus unwritten, and apparently had not determined either upon the number of species or upon the distinctness of his proposed genus." Dr. Gray, therefore, as the easiest way of meeting the difficulty, adopted the conclusion of Naudin and Bentham & Hooker, and included under Naudin's one species (*E. fabacea*) all the known western forms.

This was the condition of things when it became necessary for me to revise the species for the "Botany of California." A study of all the considerable material and notes that were available left me in no doubt regarding the generic distinctness of the western species, and I had no hesitation in adopting Dr. Torrey's name for the genus, defining five species from the Pacific Coast.

In 1877 the peculiar method of germination in *Megarrhiza* was described by Dr. Gray in the Journal of Science. In the same year Cogniaux, of Brussells, discussed the group in his "Diagnoses de Cucurbitacées Nouvelles," though uninformed respecting the recent work upon it. He followed Bentham & Hooker in including the whole in one genus, which he divided into two sections—*Euechinocystis* of two species (one eastern and one western), and *Echinopepon*, as defined by Naudin, to which he added other Mexican and South American species. It was only with much hesitation ("nous avons hesité longtemps"), however, that he assented to the reduction of the last genus. In his later revision of the order (1881) he has found reason for modifying his conclusions so far as to divide the genus into three sections—*Euechinocystis* for the one eastern species, *Marah* for the five species of *Megarrhiza* of the Botany of California, and *Echinopepon* to include sixteen southern species.

The decision to which American botanists should come respecting the rank to be given to these three well-marked groups of species is not a matter of authority, nor of personal feeling or sentiment, but one simply of good judgment based upon sufficient knowledge. As to my own opinion, after eleven years during which the subject has been several times under consideration, I still think that the separation of the genus *Megarrhiza* is the most satisfactory course to take. I also think that Naudin's genus *Echinopepon* should be re-established. The three genera appear to me to be sufficiently well distinguished by the following characters:—

ECHINOCYSTIS. Annual; germination epigæous, as usually in the order; flowers hexamerous; fruit ovoid, bursting irregularly at the apex, two-celled and the cells two-seeded; seeds flat and thin, rugose, oblong with an attenuate base.—One species, of the northern Atlantic States and Canada.

MEGARRHIZA. Perennial, with a tuberous root; germination hypogæous in a peculiar way (so far as known); flowers normally pentamerous; fruit ovoid or globose, bursting irregularly at the apex, two-celled or four-locellate, the cells one-four-seeded; seeds turgid, rounded at both ends, smooth.—The five species of the Botany of California, with *M. macrocarpa*, Rattan, and *M. Gilensis*, Greene; the last species in Arizona.

ECHINOPEPON. Annual; germination epigæous; flowers normally pentamerous; fruit oblong, attenuate at both ends, dehiscing at the apex by a deciduous operculum, two-celled, the cells four to six seeded; seeds small, flattened, rugose.—*E. horridus*, Naud., and *E. Wrightii*, of New Mexico, Arizona and northern Mexico, with several other species of still more southern habitat.

There still remain three peculiar and doubtful southern species, which have been referred to *Echinocystis*, and which may as well remain there provisionally until more is known respecting them, viz.: *E.* (?) *Bigelovii*, Cogn. (*Elaterium ? Bigelovii*, Watson), *E. minima*, Cogn. (*Elaterium ? minimum*, Watson, first described by Kellogg, in 1859, as *Marah minima*), and *E.* (?) *parviflora*, Watson. Of the three genera these species should be placed in *Echinopepon*, but it is probable that they will prove referable to some other genus.

The Flora of Banda Oriental.

BY W. E. SAFFORD, U. S. N.

(Continued from page 149.)

I saw a number of Leguminosæ about to bloom, and collected several species of Lupine, a dainty little Vetch, and a number of compositæ related to the genus *Senecio.* These, together with the *Anemone* and the early bulbous umbellifer mentioned before, reminded me strongly of the flora of the "prairies" of the United States; and I may remark here that there are also certain zoological resemblances between our prairies and the Pampas; such as the occurrence in the two regions of burrowing rodents and burrowing owls of the same genera, and prairie wolves or coyotes.

Continuing our way across the fields, we collected a small *Convolvulus* with finely divided leaves (*C. crenatifolius*, L., Herit.), *Gnaphalium Indicum*, L., an elegant little composite with small white flowers in clusters (*Pamphalea Commersonii*, Car.), and a tiny acaulescent composite with woolly leaves (*Chevreulia stolonifera*, Cass.) On a mound made by leaf-cutting ants I collected a species of Vernonia (*V. Platensis*, Less.) which was not yet in bloom. I saw at least seven species of indigenous Vernonias in the Gibert collection, but none were yet in bloom.

Reaching the brook of Las Piedras, we found growing in the water a large Pontederia (*P. nymphœfolia*, Kunth.) called by the natives "*camalote*"*;* a large sedge (*Carex riparia*, Curt.), and the common *Typha angustifolia*, L. Around its banks I collected *Mentha aquatica*, L., *Hydrocotyle natans*, Cyr., and *Samolus Valerandi*, L., which is so extensively spread throughout the world; and, near by, the only shrub of the region, *Cestrum Parqui*, which I afterwards found growing on the hillsides of Valparaiso.

I saw great numbers of a small melon-shaped cactus (*Echinocactus*, sp. ?), and of a stiff pointed leaved *Eryngium*, neither of which were in bloom. In places there were patches of beautiful dwarf blue Iridaceous plants, probably species of *Polia* or *Cyprella.* I collected also a peculiar orchid which the natives call the "toad-flower," from its color, which is green spotted with brown; and on my way back to the station gathered a *Lippia*, a *Polygala*, a coarse blue-flowered *Lathyrus*, and a low-creeping buckthorn.

On the last day of October I accompanied the botany class of the National College of Medicine on an excursion to an estancia near Santa Lucia belonging to an uncle of one of the students. Some of the young men were dressed in *gaucho* costume—*ponchos*, or blankets, of guanaco wool, with a hole in the centre through which the head is passed, very loose trousers confined tightly about the ankle, and broad-rimmed hats. Nearly all of them carried sheath knives, some of which were thrust in beautifully embossed silver scabbards, and the saddles of some of the horses awaiting our arrival at Santa Lucia station were provided with large silver stirrups.

The country surrounding Santa Lucia is slightly undulating, although at first glance it appears a flat plain. It is cut up by numerous winding streams of which the banks are thickly bordered by small trees and dense thorny shrubs. On the estancia to which we went, besides large herds of cattle, horses and sheep, we saw a number of ostriches (*Rhea Americana*) feeding on the tender Medicago. We were given several of their newly laid eggs from which very good omelets were made. For this purpose the yolk alone is commonly used; but I had an omelet made of both the yolk and the white, which proved excellent. An omelet made from a single egg was sufficient for five people. I expected to find the flavor strong, but it was as delicate as that of a hen's egg. Ostrich eggs may be bought in the markets of Montevideo, where festoons of the blown shells are also for sale, usually associated with wreaths of blooming aerophyte Tillandsias. These wreaths are very pretty ornaments. The Tillandsias commonly sold are of two species—one with spikes of flowers of a pale canary color, the other with violet flowers surrounded by crimson bracts. Specimens which I took on board ship continued blooming for several weeks. A third species, with large white flowers, called the *Clavel del Aire* (Carnation of the air), was very fragrant. It also continued blooming for a long time, hanging in the captain's cabin.

There were no vegetables raised on the estancia which we visited. While there, our food consisted of mutton, beef, good bread, preserves, cheese and potatoes. I thought it strange that with so many cows no butter was made. The meat was boiled or roasted on a spit over the fire. Our cooks were the men who lassoed and killed the cattle on our arrival. Each meal consisted of four courses: boiled meat flavored by putting grains of maize into the water; soup; *asado*, or ribs roasted over the fire, and coffee. Everybody drank wine, which was a very good quality of claret In the morning and between meals it was customary to take *maté*, an infusion of the leaves of *Ilex Paraguayensis*, which is sipped from a gourd through a silver tube called a *bombilla*. The gourd is called the *maté*, the leaves are called *yerba*. This beverage is very common throughout South America. It tastes like tea, but has a peculiar bitter flavor, which is not very agreeable to a novice. It is taken very hot, and is usually sweetened with sugar. Frequently, from the scarcity of gourds, or perhaps as a social custom, the same gourd and *bombilla* is passed around; but the custom is not so common as formerly. The Indians of the Pampas are said to be very fond of *maté*. I afterwards saw it for sale in Punta Arenas, Patagonia, and all along the coast of Chile.

I noticed a rancho in process of construction, and it occurred to me that it would be interesting to know of what materials it was composed. The posts, I learned, were made of the Ñandubay, a leguminaceous tree related to the *Algaroba*, which, as I have before remarked, resists decay when buried. All of the posts which I saw were riddled with holes made by the larva of some boring insect. The tree is now becoming scarce near Montevideo. The posts used in building the rancho were each composed of two pieces, the lower of *Ñandubay*, which entered the ground, and the upper of *sauce del pais* (native willow), which is very abundant along the banks of the streams. I think the Ñandubay is a species of *Prosopis*: the willow *Salix Humboldtiana* is the only species of the genus indigenous to the region. It is a beautiful tree, the light-green foliage appearing at the same time as the blossoms. We found it in full bloom, and collected a number of specimens of both staminate and pistilate flowers. The roof of the rancho was thatched with *Paspalum quadrifarium*, Lam. The sides were to be of wicker-work of interlacing boughs of the willow. Some of the other ranchos which I saw had their sides made of sod.

A stream called the *Arroya de Canelones* ran through the estate. Like most of the streams of the regions, its channel was very crooked, owing to the flatness of the country. Its margins were bordered by several species of water-plants: Pontederias, Potamogetons and Typhas, and in places I saw some Lemna floating. On the banks grew the beautiful *Salix Humboldtiana*, Willd., covered with a mass of yellow catkins; *Celtis tala*, Walp. (nom. vulg., "tala"), a small thorny tree with smooth white bark, belonging to the same genus as our hackberry; *Lucuma Sellowii*, Alph. DC. (called "mata-ojo," or eye-bane), one of the Sapotaceæ, not yet in bloom, with leaves like those of the Oleander; a small tree called "*Molle*" (*Duvana dependens*, DC.), with inconspicuous flowers, just beginning to open, and with its branches covered with galls; and a beautiful fragrant yellow Acacia (*A. Farnesiana*, Willd.) called "*espinillo*," or "*aroma*," by the natives. This was in full bloom. I gathered a quantity of its blossoms to pack away with clothing in my lockers on board ship. Climbing among its branches was a beautiful *Solanum* (*S. boerhaviæfolium*, Sendt.), with clusters of large pale lavender flowers. I afterwards found this vine in barberry thickets (*Berberis laurina*, Billb.), and with it a bright crimson *Tropæolum* (*T. pentaphyllum*, Lam.), with elegant nodding tubular flowers and delicate five-parted leaves. The effect of the yellow blossoms of the barberry combined with the delicate lavender and the crimson of the climbing vines, was exquisite.

Farther up the stream I collected *Ilex dumosa*, Reiss., and several species of Euphorbiaceæ, among which were *Phyllanthus Sellowianus*, J. Müller, and two species of *Sebastiana*, called by the natives "blanquillo." All of these were scrubby trees or shrubs. I also collected in the *montes*, or copses, along the stream, *Schmidelia edulis*, St. Hil., which is said to bear small edible berries, and *Oreodaphne acutifolia*, Nees., called "white laurel" by the natives from its dark, shining leaves. This, I think, completes the list of the trees of the region which I observed, though I heard of several others which I did not see, among which were two or three species of palms.

While visiting the estancia we drove across the country to the water-works of Santa Lucia, which supply Montevideo with water. The fields were gay with patches of scarlet, white, yellow, blue and rose color, from the Verbenas, Anthemis, Senecios, dwarf Irids and Oxalids, which I had before collected at La Paz; and in places whitish patches of thistles extended for miles. I collected several species of thistles, but, as I had not brought a sufficient supply of paper with me, most of them were spoiled before I returned to Montevideo. I call them all thistles, although they are of different genera, since they are related to one another in structure and habit of growth, and are armed with spines.

A large variegated thistle had just begun to bloom. It was the milk thistle, *Silybum marianum*, Gærtn., and is called by the natives "*Cardo asnal.*" It has large purple heads of flowers, and leaves variegated with a network of white veins. It has been naturalized from Europe, and has also established itself on the Pacific coast of the United States. It is this species which Darwin calls the "giant thistle of the Pampas." *Cynaria cardunculus*, also an introduced species, covered hundreds of acres. In speaking of the abundance of this and the preceding species in some parts of the Banda Oriental, Darwin says: "There were immense beds of the thistle, as well as of the cardoon; the whole country, indeed, may be called one great bed. The two sorts grow separate, each plant in company with its own kind. The cardoon is as high as a horse's back, but the Pampas thistle is often higher than the crown of the rider's head. To leave the road for a yard is out of the question; and the road itself is partly, and in some cases entirely closed."

I noticed two other thistles, neither of which were indigenous—the star thistle, *Centaurea calcitrapa*, L., which has also been sparingly introduced on the eastern coast of the United States, and the *Centaurea lanatus*, D.C. They were not yet in bloom, but the former species had its pretty pointed flower bracts well developed, forming symmetrical stars with spine-tipped rays. Of all the thistles, the cardoon was by far the most abundant. Darwin says that he doubts whether "there is any case on record of the invasion on so grand a scale of one plant over the aborigines." We may well be thankful that it has not established itself on our Western grazing lands.

At the water-works we found a number of plants growing on the rocky banks which we had not observed elsewhere. Among them were a *Cuphea*, a *Scutellaria*, and two new species of Verbena, of which one bore pretty scorpioid racemes of purple flowers with yellow eyes. I also collected specimens of the rank green *Valeriana polystachya*, Smith, of both sexes; a climbing *Mikania*; a *Smilax*, and a delicate little plant related to the Primulaceæ, with yellow flowers, on slender peduncles, having bearded filaments like *Anagallis*.

I must not forget to mention a pretty blue-and-white *Salvia* which I found growing under bushes; *Acæna Eupatoria*, a rosaceous plant with the habit of Agrimony; and a Liliaceous plant bearing umbels of white fragrant flowers (*Nothoscordum Sellowianum*, Kunth.), which I afterwards found in Chile. In the Banda Oriental it is called *lagrimas del Virgen*, or "the Virgin's tears."

In conclusion I will mention a few more plants growing near Montevideo which are also found in the United States. Some of them are South American species which have established themselves with us; others are North American species which have probably been introduced into South America, and it may be that some are indigenous to both floras.

The most abundant are the *Erigeron Canadense*, now of almost world-wide distribution; *Specularia perfoliata*, Alp. DC.; *Aster subulatus*, Mich.; *Solidago odora*, Ait.; *Bidens bipinnata*, L.; *Galinsoga parviflora*, Car.; *Gnaphalium purpureum*, L.; *Gilia glomeriflora*, Benth.; *Quamoclit coccinea*, Mœnch.; *Evolvulus sericeus*, Swtz.; *Physalis viscosa*, L.; *Linaria Canadensis*, Spr.; *Verbena venosa*, Gill.; *Euphorbia hypericifolia*, L.; *Senebiera pinnatifida*, DC.; *Polygonum acre*, Kunth.; *Mollugo verticillata*, L., several grasses and two ferns, *Woodsia obtusa*, Hook., and *Polypodium incanum*, Swtz.

The presence of two species of *Bauhinia*, which have been described by Bentham, may be interesting to the student of the fossil botany of the United States, as this genus has been found in the Amboy Clays of New Jersey.

U. S. S. "Mohican," Panama Bay, April 23, 1887.

Bibliographical Notes on well known Plants.—II.

By Edward L. Greene.

MYOSURUS MINIMUS, Linn. Spec. Pl. 284 (1753).

This little herb appears to be no rarity in western Europe, where it has been more or less familiarly known to all botanical writers since about the middle of the sixteenth century. For about three hundred years it remained the only known representative of its genus, and then a second species was added from South America. Within the last seven years three others have been published from the western parts of North America, and there are perhaps two more lying in our herbaria, mixed with the typical one, and waiting to be named and characterized. At all events, the genus is now proven to belong properly to North America, where all the known species are indigenous. As a genus it is a very natural one, none of the modern species calling for any alteration of the generic character; and the essential bibliography of it is therefore European, and also rather ancient.

Bentham & Hooker in the latest edition of their Genera Plantarum ascribe this genus to Linné, probably because they wish to avoid—on account of the vast expenditure of time and labor involved in the attainment of historical truth and accuracy in many cases—all reference to pre-Linnæan authorship of genera.

In each of the two recent monographs* of *Myosurus*, Dillen (1719) is credited with its authorship, rather than Linné (1737). But Dillen, although at work under the heading "Nova Plantarum Genera," does not in his text assume to be propounding, in this particular instance, a genus veritably new. He is perfectly aware that this one was so named, and well enough defined, about a hundred and forty years before his own day. Let me translate his very first phrase regarding it: "MYOSUROS is thought by Ray, in his History, to be referable to Ranunculus, and Tournefort, in his Institutes, has followed him in so referring it." Then come Dillen's reasons for dissenting from the opinion of these high authorities whom he has cited. The date of Ray's History is 1688; of Tournefort's Institutes, 1700. They were, for their time, noble treatises on systematic and historic botany. But, keen and penetrating botanical observer that Dillen was, he saw generic characters where those venerated masters and very high authorities had overlooked them; and then, severely just and strongly conservative man which every critical or controversial page of his exhibits him, he stands up to proclaim the genius and defend the rights of other botanists a hundred years dead, and whose works are thrust aside, now in his time, as antiquated.

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* Greene, Bull. Cal. Acad., i., 276, December, 1885. Gray, Bull. Torr. Club, xiii., 1, January, 1886.

It is true we should not now call l'Obel or Dodoens profound systematic botanists; but each of these authors gave his account of the type before us, under the name *Myosuros*, accompanied by a very clear wood-cut of the plant; and many other authors of succeeding decades followed them.

The genus should be credited to l'Obel (1576). A century later than his time it became the fashion to call the plant a species of *Ranunculus*, and then came the great "Dillenius" to its rescue as a generic unit.

The name is, of course, but the early and apparently universal vernacular of "mouse-tail," put into Greek; and Linné, in selecting a specific name for it, allowed his fancy to dwell upon the fact that, for a mouse's tail, it was a very small one, hence our *Myosurus minimus*. Little did he dream that at some future day a half dozen species would be known, and that then *maximus* would seem a better name than *minimus* for the original one, which is the largest of them all.

A new Variety of Aralia nudicaulis, L.

For several years I have found a variety of the above so different from the type as to deserve a special description. It differs from *A. nudicaulis* in being larger, in having many added leaflets, and, more than all, in having most of its flowers in compound umbels from the first division of the scape.

Aralia nudicaulis, L., var. PROLIFERA, n. var. Plant smooth and nearly stemless; leaf solitary, decompound, palmately about twice ternate, the divisions generally pinnate into threes or fives; one division often consisting of a single leaflet; leaflets, twenty-five to forty, oblong-obovate, acuminate, finely serrate; scape with three or four primary divisions, the latter having many rays 6″ to 15″ long, forming umbels; the short rays bearing single flowers, the long ones umbelets of many (ten to thirty) flowers each; the umbelets on each plant varying in number from five to seventy. Near Lambertville, New Jersey.

AUSTIN G. APGAR, Trenton, N. J.

A Point in Nomenclature.

There can be no question that the specific name to be borne by our species of *Cliftonia* is that given to it originally by Gærtner, namely, *Cliftonia nitida*. Its synonymy in brief is as follows:

Cliftonia nitida, Gærtn., fil., Fruct., iii., 247, t. 225, fig. 5 (1805).

Ptelea monophylla, Lam., Ill., i., 336 (1791). This long remained a puzzle, though correctly solved by Nuttall (Gen., i., 104). Jussieu (Mem. Rut., 127) suspected it to be a species of *Rumex*.

Milocaryum ligustrinum, Willd., Enum., 454 (1807).

"*Waltheria Caroliniensis*, Fras., Cat."

Cliftonia ligustrina, Spreng., Syst., 2, 316 (1825).

SERENO WATSON.

Index to Recent American Botanical Literature.

Botanical Estrays.—T. H. McBride. (Amer. Nat., xxi., pp. 572–573.)

Mr. McBride records the discovery of two species of *Lycopodium* at Iowa City; none have hitherto been reported from the State.

Carices of Pennsylvania—A List of the. (Proc. Acad. Nat. Sci., Phila., 1887, pp. 68-80; advance sheets. Also reprinted, pamph., 8vo., pp. 12.)

Professor Porter enumerates 98 species and 24 varieties of *Carex*, an unexpectedly large number for a single State. We doubt if New York has as many, and the number exceeds those detected in New Jersey by at least fifteen. Full localities are given by counties. Pennsylvania is the southern limit of several species, among them *C. pauciflora*, Lightf., *C. retrorsa*, Schweinitz, *C. vulgaris*, Fries, *C. Magellanica*, Lam., *C. arctata*, Boott., and *C. chordorhiza*, Ehrh., while it is the most northern habitat of *C. Shortiana*, Dewey. Prof. Porter contends for the specific rank of his *C. Smithii*, and describes the following new varieties: *C. granularis*, Muhl., var. *Haleana*, *C. tetanica*, Schk. vars. *Canbyi* and *Carteri*.

Cercis.—C. G. Lloyd. (Drugs and Medicines, N. A., ii., pp. 122–125; six figures.)

Claims of Botany.—W. W. Bailey. (Education, vii., 704-713.)

We are pleased to note in these arguments some points which the teachers of this metropolis will heartily substantiate. We fear that "*text-book instruction*" is yet entirely too prevalent, and many are the teachers who know not the common plants around them. There is still too much striving after words and definitions, statements and compositions, no matter how they are arrived at, and plants as objects to look at and to watch and think about are not so important as they are to make up into lessons. Drawing is not sufficiently used as an accessory and test, and children are more familiar with the conventionalized forms of their portfolios than with the natural objects. Not only is there an increasing demand for teachers, but governesses, companions and superior nurses with the knowledge sufficient to answer the questions of children are wanted and cannot be had.

Contributions to American Botany, XIV.—Sereno Watson. (Proc. Amer. Acad. Arts and Sci., xxii., pp. 396–481; reprinted.)

The first seventy pages of Dr. Watson's latest "contribution" are devoted to an enumeration of the plants collected by Dr. Edward Palmer, in the State of Jalisco, Mexico, in 1886, at and about the city of Guadalajara. The collection includes 675 species, over ten per cent. of which are new. *Corythea* is a new genus of Euphorbiaceæ and *Prochnyanthes* a new genus of Agaveæ. The determinations of Gamopetalæ are by Dr. Gray, and among them we find a new genus of Asclepiadeæ, *Mellichampia.* Dr. Vasey finds several new species of Gramineæ, and *Acrostichum araneosum*, *Notholæna aurantiaca* and *Cheilanthes Palmeri* are new ferns by Professor Eaton.

The second part gives descriptions of new species of plants from various North and Central American localities. Those from the United States are as follows: *Cardamine Lyallii; Arabis confinis*, which includes all the eastern plants referred to *A. Drummondii; A. Bolanderi*, *A. perennans*, *A. Beckwithii*, *A. Lemmonii*, *A. Parishii*, and *A. pulchella*, M. E. Jones, all western; *Thelypodium stenopetalum*, *Silene longistylis*, Engelm.; *Lupinus Cusickii* and *L. Schockleyi; Astragalus Hendersoni*, *A. accidens* and *A. lectulus; Orogenia fusiformis; Peucedanum circumdatum* and *P. Kingii* (the latter=*P.. graveolens*, Wats.); *Podistera* is a new genus of Umbelliferæ. with a single species, *P. Nevadensis*, *Microseris anomala*, from Santa Cruz Island; *Camassia Cusickii; Erythronium Hendersoni, E. citrinum* and *E. Howellii*, all from Oregon; *Juncus Congdonii*, from Merced Co., Cal.

N. L. B.

"*Crazy*" *Pollen oj the Bell-wort.*—Byron D. Halsted. (Bot. Gazette, xii., pp. 139, 140, one plate; also reprinted.)

Description and illustration of very curious forms of pollen tubes of *Uvularia grandiflora* grown on culture slides.

Diphylleia cymosa.—C. G. Lloyd. (Drugs and Medicines N. A., ii., pp. 120, 121.)

Elements of Botany; including Organography, Vegetable Histology, Physiology, Taxonomy, and a Glossary of *Botanical Terms.*—Edson S. Bastin. (8vo, pp. 282, 459 figures; Chicago, 1887.)

Professor Bastin has written a very useful book, and one for which we predict a large sale. It is not a reference work in any sense, but a simple, straightforward presentation of the subject, which will prove of the highest value to beginners and may be used advantageously by more advanced students. Its arrangement and methods are indeed remarkably well adapted to an ordinary undergraduate course of study.

Organography is first taken up, and followed by Histology. It seems to us more advantageous to reverse this arrangement, though it is a good deal a matter of taste and depends upon the opinion of the instructor.

The systematic portion of the book is contained in the last fifty-four pages, and is a very concise treatment of the topic. We note a few points in which we can hardly agree: thus Yeast is included in Schizomycetes—microbes may better retain that name to themselves alone; the treatment of the Thallophytes is far simpler under the natural classes Algæ, Fungi and Lichens as primary subdivisions, than under the method of spore formation and sporocarps, which throws most unlike organisms together, but botanists appear to have gone mad on this system of late, in spite of its intricacy and unnaturalness; Sphagna are considered as a mere genus of mosses, but may better be taken as a distinct class; in the treatment of Pteridophyta no mention is made of the two well-marked series of Homosporæ and Heterosporæ, and on page 236 the word Filicinæ is misspelled so as to remind one strongly of Catnip.

The illustrations are generally good, though some of them will not bear close examination. They have one very great recommendation—they are all new, the borrowing photo-engraving process not having been invoked in the preparation of this text book!

Erechtites hieracifolia.—C. G. Lloyd. (Drugs and Medicines N. A., ii., pp, 126 et seq., one plate and illustrations.)

Fresh-water Algæ of the United States.—Francis Wolle. 2 vols., 8vo., 157 plates; price $10.

This work, which has long been looked for with interest, is now completed and ready for issue. It supplies a long-felt want, for Wood's Contribution, the latest American work on this subject, was published about fifteen years ago, and described all the then known Algæ—only about 375 species. Mr. Wolle's new work embraces 13,000—all the species of this country known up to the present time. The first volume contains the text, and the second the plates. These are all colored by hand and contain over 2,000 figures. The volumes correspond in size, press work and plates with the author's "Desmids of the United States," to which the work is complemental. The price may seem high, but remembering the number of plates and the comparatively small demand for a work of the kind, hence the necessarily small edition, it is really very low, low even as compared with a recent work on British Fresh-water Algæ, which sells for $22.00.

Guatemala.—Undescribed Plants from.—I. J. Donnell Smith, (Bot. Gazette, xii., pp. 131–134.)

This is the first installment of descriptions of new species and varieties of plants from the collections of Mr. H. von Türckheim, a resident botanist of Coban. *Vochysia Guatemalensis, Hamelia calycosa, Ardisia pectinata, Myriocarpa heterospicata, Nephrodium Tuerckheimii, and N. Fendleri*, Hook., var. *paucipinnatum* are described.

Life History of the Diatomaceæ—A Contribution to the.—H. L.

Smith, Hon. F. R. M. S. (Proc. American Society of Microscopists, 1886, pp. 30 66; five plates, colored.)

Prof. Smith is well known as a life-long student of the Diatomaceæ, also as the distinguished author of the system of classification now so generally adopted, hence his conclusions carry with them the weight of acknowledged authority. The paper is too long to give a synopsis of, but the subject is treated under the following heads: I. *The Structure of the Diatom Frustule, the Nature of the Envelope and the Typical Variations.* II. *Distribution and Arrangement of the Internal Contents.*

In summing up the first part, he says: "It appears that for all diatoms there is a general type of structure, that the departure from the normal form is regular and often quite gradual, and it is to be regretted that minute considerations, such as varied outline, difference in size, finer striation, abnormal forms and the like, have sufficed so often for proposing new species, to say nothing about genera; whereas, looking at the subject from a more rational standpoint, and guided by safer principles of philosophizing, one may well be assured that nearly half the present admitted genera, and many more of the species, might be blotted out with advantage." C. H. K.

Lima Beans in Germination—Experiments with.—W. J. Beal. (Amer. Nat., xxi., pp. 576,577; one plate.)

Lindera Benzoin.—C. G. Lloyd. (Drugs and Medicines N. A., ii., pp. 117–119.)

List of Native and Introduced Plants observed in Flower in the Vicinity of Salem during the Spring of 1886, *on or before May* 1*st.*--J. H. Sears. (Bull. Essex. Inst., xviii., pp. 95–98.) A list of about 150 species with common names.

List of Recently Identified Fossil Plants belonging to the United States National Museum, with Descriptions of several new Species.—Leo Lesquereux. (Proc. U. S. Nat. Mus., 1887, pp. 21–46; four plates.)

An enumeration of 203 species, of which the following are new: *Pecopteris Powellii, Cycadeo-spermum æquilaterale, C. faboideum, C. subfalcatum, Caulinites Beckeri, Irites Alaskana, Quercus Crossii, Andromeda linearifolia, Vaccinium Coloradoense,* *Cratægus Holmesii, Cissites microphyllus, Grewiopsis acuminata, Phyllites fraxineus* and *P. mimusopsoideus.*

Lobelia.—C G. Lloyd. (Drugs and Medicines N. A., ii., pp. 101-106; one plate.)

Descriptions are given of structure, history and medical properties of *L. syphilitica* and *L. cardinalis.*

Milkweeds.—Joseph F. James. (Amer. Nat., xxi., pp. 605-615; nine figures.)

A popular account of the structure of the flowers, the pollination and economic relations of the Asclepiadeæ.

Movement of Diatoms.—Cornelius Onderdonk. (The Microscope, May, 1887.)

Although several theories have been proposed to account for the movement of diatoms, none have proved so satisfactory as to be generally accepted. This paper will be read with interest by those who have made the matter a subject of thought. Mr. Onderdonk's theory is, briefly, as follows:—That living protoplasm is matter in rhythmic motion and dead protoplasm is matter at rest; that all living diatoms are encased in an envelope of protoplasm, and that it is the rhythmic action of this that causes the motion of the frustules. He calls attention to the fact that the force exerted is immediately *on the surface* of the diatom; that this force is exerted *over the surface* from end to end of the diatom, and that the force is *rhythmic.* He considers this rhythmic motion to be akin to the cyclosis which takes place in the interior of a cell. C. H. K.

Nitrogenous Bodies in Plants—The Occurrence and Functions of Certain.—W. E. Stone. (Bot. Gazette, xii., pp. 123-130.)

An interesting account of present knowledge of this subject.

Origin of the Tomato from a Morphological Standpoint.—L. H. Bailey, Jr. (Amer. Nat., xii., pp, 573-576; one plate.)

Reasoning from the results of an exhaustive study of twenty-five varieties of cultivated Tomatoes, Professor Bailey concludes that the "Cherry Tomato," *Lycopersicum cerasiforme*, Dunal, is the original type from which all the others have been derived.

Primer of Botany.—Mrs. A. A. Knight, Robinson Seminary, Exeter, Mass. (Ginn & Co., Boston, 1887.)

The object of this little book is to present the essential points of plant histology and physiology with a little morphology in the simplest objective form to children of primary grades having no knowledge of the subject. The use of the microscope is expected from the teacher at the start, and yet the questions and statements, and even the methods, are so ambiguous that we doubt the ability of the average teacher to use this primer intelligently.

Lesson A. begins with "What the living part of a plant is," and the first page alone is the veriest mixture of the simple and the complex, as these two sentences will show: "State something about a lily." "What is the living part of a plant?" Some of the statements emphasized by heavy type, which are evidently intended for memorizing, are questionable. Here is one: "II. Protoplasm is found *everywhere* in a living plant." The statement has its exceptions. Whether the child is supposed in one lesson to have arrived at this objectively, or whether the teacher is supposed to take it for granted that they are capable of fully understanding the scope of *everywhere* in this sentence, we are left to guess.

Scrophularia.—C. G. Lloyd, (Drugs and Medicines N. A., ii., pp. 106-116; one plate and wood cut.

The Task of American Botanists.—W. G. Farlow. (Pop. Sci. Month., xxxi, pp, 305-314.)

"If we are behind some other nations in the quantity and quality of our botanical investigations, what is the reason? It must be through lack of inclination, lack of time, lack of means, or lack of the requisite training." With his usual clearness and masterly grasp of the subject, Prof. Farlow then tells much that we knew or had heard before with a force and individuality quite original. He speaks pretty plainly against the amount of class-work required of professors in our American colleges and the need of more assistance, stating that a "great gain will have been made if the public can be persuaded that professors in colleges ought to be allowed time for, and be expected to do, original work." In answer to the question, "What sort of botanical investigation is needed in this country?" he says: "In a new country the first work must be almost entirely descriptive and classificatory; and, when this work has reached a sufficiently advanced stage, histology, physiology and the study of life-histories assume more and more importance." Where do we stand? "We stand where Germany formerly stood. Our country is so large, and some parts of it so little explored, that descriptive work has by no means reached its limit. The only question is how to have it well done." "Strange as it may seem to some ears, it appears to me that histological and developmental work is what is best adapted to non-professional botanists." "Inasmuch as the larger libraries and collections are in the colleges and larger cities, descriptive work, if it is not to be shabbily done, must be done by persons connected with colleges, having ready access to herbaria and libraries." "If we should look to college professors and a few experts for what we still have to be done in systematic botany, and to those connected with the more important laboratories for physiological work of the higher grade, histology and the study of life-histories are subjects of vast extent, and, in most of their phases, can be studied successfully by private individuals as well as by professionals." "In the older parts of the country, including even the Mississippi Valley, it seems to me that the rising generation would make the best use of their opportunities by working out some of the many important questions in histology, and in studying the life-histories of different plants, more especially cryptogams."

Tulostoma mammosum—The Growth of.—C. E. Bessey. (Amer. Nat., xxi., pp. 665, 666.)

Botanical Notes.

Report on the Scientific Results of the Exploring Voyage of H. M. S. Challenger, 1873–76.—*Part IV., Diatomaceæ.* Count F. Castracane; pp. 178; 30 plates, 393 figs.

The literature of the Diatomaceæ is so scanty that any addition to it is joyfully welcomed, especially when, as in this instance, we have the summing up of the results of a famous scientific expedition. We cannot help wishing, though, that authors would refrain from creating new species upon such slight pretexts, for many of the forms figured are clearly referable to species that have been already described by others under different names, and so the list of synonyms is unwarrantably increased to the confusion of the skilled student and utter bewilderment and discouragement of the amateur. In looking over the work, it is remarkable to notice how few type forms are mentioned. Out of a total of 337 species described, 241 are marked *n. sp.*, 78 are marked varieties, and 18 are type species. Five new genera are created, viz. :—*Cyclophora*, *Dactyliosolen*, *Corethron*, *Willemöesia*, and *Ethmodiscus*. It is unfortunate that the author has, in so many instances applied names to new species that have already been appropriated by others. The following are instances: *Amphora stauroptera*, Daunfelt, *Navicula abnormis*, Grunow, *N. decipiens*, O'Meara, *N. mirabilis*, Fortmorel, *Rhaphoneis elliptica*, Ehrenberg, *Synedra lanceolata*, Kutzing, *Surirella Japonica*, Ehrenberg and A. Schmidt, *S. multicostata*, Fortmorel, *Campylodiscus humilis*, Greville, *Actinocyclus anceps*, Fortmorel, *Coscinodiscus decrescens*, Grunow, and *C. undulatus*, Cleve.

One of the most valuable and interesting portions of the report is the introduction, and we trust the author's suggestion as to the use of the terms *zonal* and *valval*, instead of *front-view* and *side-view*, will be generally adopted. The latter terms are misleading, and German writers use them in a different sense from English writers. [C. H. K.]

Annals of Botany is the title of a proposed new serial to be edited by Professors Bayley Balfour and S. H. Vines, of England, and Dr. Farlow, of Cambridge, Mass. It will be devoted to all branches of the science and be adequately illustrated. The subscription price is one guinea per volume.

Vincetoxicum nigrum on Long Island. Mr. E. S. Miller writes that he noticed this plant growing along the main street of Bellport, Suffolk County, June 20th, 1887.

A Supplement to Bentham and Hooker's "Genera Plantarum." The Gardener's Chronicle for May contains a notification of a prospectus by Messrs. Borntrager, of Berlin, of a systematic alphabetic conspectus of all genera published down to 1885, including Ferns and Lycopods.

Proceedings of the Club.

The regular monthly meeting was held at Columbia College, July 12th, 1887. Mr. Henry C. Lee was elected an active member. The resignation of Mr. John A. Staunton was accepted and his name transferred to the list of corresponding members.

Mrs. Britton exhibited and remarked on some seedling beeches collected May 21st, at Clove Lake, Staten Island, in which the leaves showed a tendency to pinnation, such as is found in the cultivated "Fern-leaved Beech"; also seedlings of *Nuphar advena*, collected near New Dorp, Staten Island, with membranaceous submersed leaves similar to those she had formerly reported on *Limnanthemum lacunosum*, and of constant occurrence on *Nuphar Kalmianum;* also a specimen of *Clematis ochroleuca* from Todt Hill, Staten Island, with fasciated stems and deeply tri-lobed leaves.

Dr. H. H. Rusby spoke of the advantages of the use of straps in drying plants. His method was to carry to the field a quantity of newspapers between white-wood boards strengthened by thin battens within and without, and secured by a pair of large, stout straps. In two pairs of such boards he had frequently carried home from 500 to 800 specimens. His driers consisted of two thicknesses of ordinary house sheathing, without tar or sizing, between which were quilted from two to six newspapers. These would become saturated with moisture twice a day, if the weather was fine enough for changing so frequently, and would thus cure specimens in a very short time, often in thirty-six to forty-eight hours. If, on the other hand, the weather was bad, the specimens would take comparatively little harm in these thick driers for two or three days. By tightening the straps alternately, a pressure of 300 pounds could be easily secured. When the plants were dry they were placed in small bundles under light pressure and exposed to a hot sun for two or three hours before being packed.

Dr. Britton showed specimens of *Oakesia (Uvularia) sessilifolia*, Watson, collected near Tom's River, N. J., showing in its shining, rough-edged leaves a transition towards the southern *O. puberula.*

He also remarked on the recent death of Mr. G. M. Wilbur, for many years Recording Secretary of the Club, and also on the death of Mr. Julius Bisky one of its younger and most active members. On motion, the President appointed committees to prepare appropriate resolutions.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XIV.] New York, September, 1887. [No. 9.

Bibliographical Notes on well known Plants.—III.

By Edward L. Greene.

NYMPHÆA and NUPHAR.

By a very great majority of botanists, taking the past along with the present, these two genera have been confounded. Pond-lilies, white-flowered and yellow-flowered, have been known from the remotest antiquity, and both were called *Nymphæa* by the Greeks and Latins of old. In all the ponderous folios and quartos of the sixteenth, seventeenth and eighteenth century botany, as well as in several of the very front rank of authors in the earliest decade of our own century, we find *Nymphæa* still undivided, and embracing all the known species of water lilies, whether white or yellow-flowered. Until about eighty years ago, *Nymphæa alba*, a binary name still in use, for a certain European plant, included several of our nymphæas, and *Nymphæa lutea* covered an equal number of our nuphars. The fact that Brunfels, as long ago as the year 1534, proposed for these plants the Arabic name *Nenufar*, in place of the Greek *Nymphæa*, is worth mentioning only because it is about the first appearance of the name at present accepted for the yellow pond-lilies. He had not a thought of distinguishing here two genera.

It is not strange that Linné did not separate them; because the faculty for generical discrimination was not among the elements which combined to make his greatness. In this regard, there were not many among his contemporaries or immediate forerunners who did not excel him. Some of the Linnæan genera are pretty nearly co-extensive with natural orders as now everywhere received. Yet A. L. de Jussieu (1789), and even Joseph Gærtner (1791), that masterly botanist who, in analytical power, surpassed all his predecessors, and whose great work, De Fructibus et Seminibus Plantarum, marked the beginning of a new era in the history of genera, still left the old genus *Nymphæa* undivided. It might well at the present day raise a doubt, and move one to make a new and careful investigation of the characters of *Nuphar*, this circumstance, that none were discerned by Tournefort, Plumier, Dillen, Micheli, Vaillant, Linné, Haller, Adanson, Jussieu, Jacquin, Mœnch or Gærtner. When all these and other celebrated men of that splendid epoch had failed to perceive that the so-called yellow pond-lilies were of a different genus from the white, it is, if true, somewhat remarkable that a man so little above mediocrity in point of talent as Sir J. E. Smith, should have been the one to distinguish them. But that it was he is what all our books now seem to say; for *Nuphar* is everywhere credited to Smith, who published it in Sibthorp's Flora Græca in 1806. That the genus is entirely valid we may well believe from this, that ever since its promulgation, now eighty years ago, it has been approved by all authorities, even finding ready acceptance with that celebrated cotemporary writer upon genera, Professor Baillon, who is so little disposed to admit genera with weak characters, that he remands *Negundo* to *Acer*, *Coptis* to *Helleborus*, and writes *Aconitum* as doubtfully distinct from *Delphinium*. As for the author to whom should be accorded the honor of having separated these two water-lily genera aforetime confounded, I venture to express a doubt that it is Smith. Such a fine piece of generical discrimination seems far less likely to have emanated from that plodding conventionalist, than from the penetrating and analytical mind of his gifted rival, Salisbury. It was the latter who took the water-lilies out of the Papaveraceæ, where they had been placed by the elder Jussieu, and founded on them the new natural order, Nymphæaceæ, at the same time separating generically the white from the yellow-flowered kinds. It is certain that a portion of this work was published prior to the appearing of Smith's *Nuphar;* perhaps all of it was; for there is apparently some doubt as to whether the part of Kœnig and Sim's Annals containing Salisbury's dissertation is of the date 1805 or 1806. This work must now be rare, and I have not seen it. But the plate in the Paradisus Londinensis, bearing the figure and the name of Salisbury's *Castalia magnifica*, was published in October, 1805, and this plate alone would almost or altogether establish a generical priority. If the corresponding pages of the Annals also appeared in 1805, then beyond all question Smith's *Nuphar* must pass into synonymy, and Salisbury's *Castalia* obtain the place to which priority would entitle it. It must be left to some one whose library facilities exceed mine to settle this question of the dates of publication. As I have intimated above, I am suspicious that in the matter of these water-lily genera, we have another instance of that discreditable treatment of Salisbury's genera and species, with which British botanists both of his own and later times are chargeable.*

The uncritical reader will perchance infer from what I have been saying, that Smith's *Nuphar* and Salisbury's *Castalia* are synonymous, which is not the case; for the last-named author kept the classical name *Nymphæa* for the yellow-flowered, or nuphar species, and this with good reason. It was very likely these plants to which *Nymphæa* was first applied. Then, for the more showy red and white and blue-flowered genus he proposed the new and beautiful name, *Castalia ;* one which I judge, from all I am able to gather out of the books to which access is afforded me, will have to be restored.

I must not conclude this note without pausing to qualify one general statement made at the outset. It is not true that every one of the pre-Linnæan botanists confused the two genera herein discussed. They were accurately defined and separately named eighty-five years before either Salisbury or Smith took them in hand, and that by the very celebrated author, Bœrhaave (1720). He seemed to know that it was to the homely yellow-flowered plants (our nuphars) that the name *Nymphæa* belonged, and so he left it to designate that group; hence Salisbury, in doing the same thing, no doubt purposely followed him. For our nymphæas (*Castalia*, as Salisbury called them), he coined the name *Leuconymphæa.* Luckily for us who all will prefer the easy and graceful *Castalia* to the lumbering *Leuconymphæa*, Bœrhaave's priority goes for naught, inasmuch as it is prior to Linné; but the credit of seeing the two genera in what all before him had called one, and of clearly bringing out their several distinguishing points belongs to him, and not to any lights of this more favored and more boastful age.

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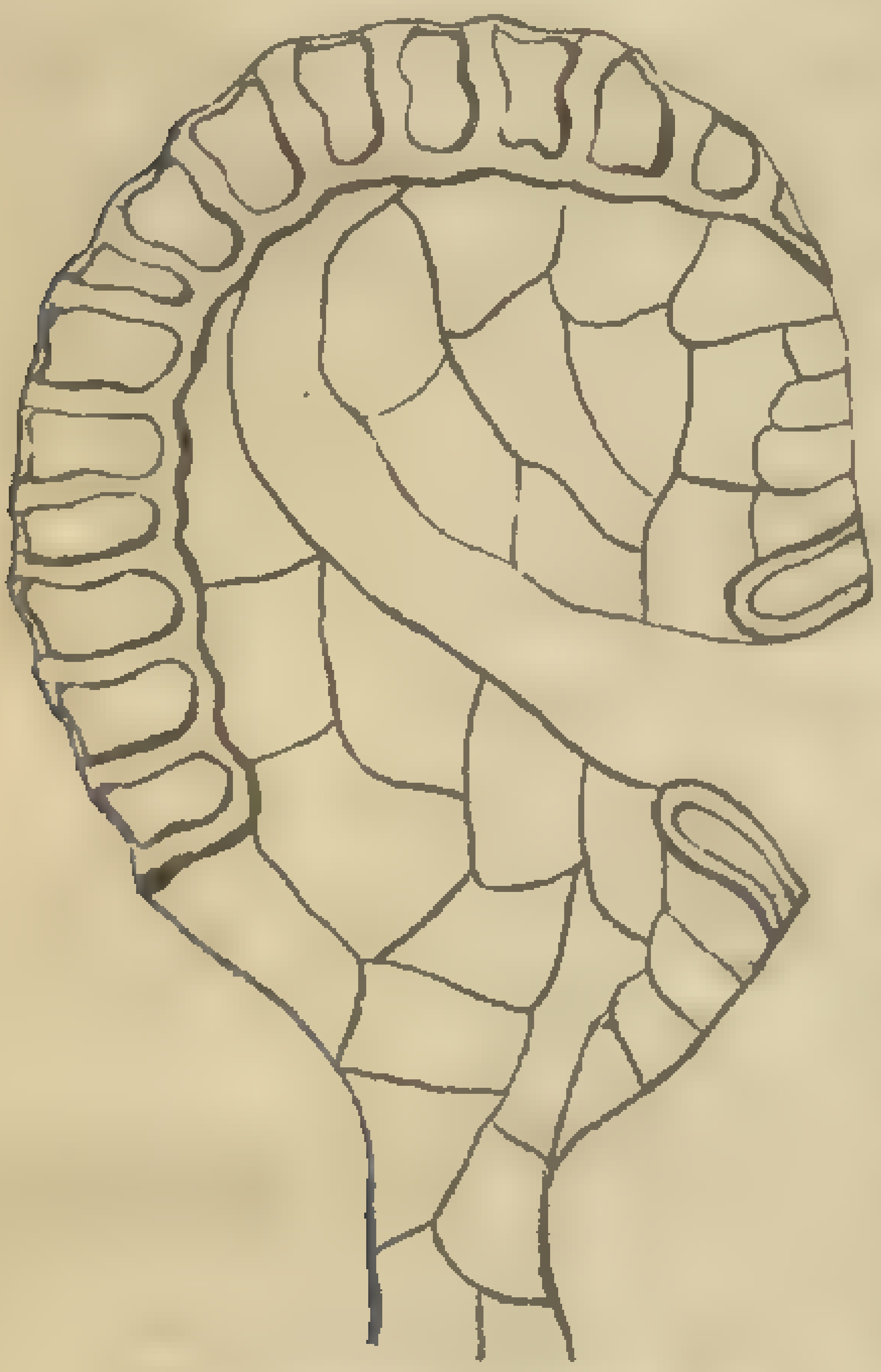
* See Journal of Botany, xxiv, 49 and 296.

Dehiscence of the Sporangium of Adiantum pedatum.*

BY FLORENCE MAY LYON.

The sporangia of *Adiantum pedatum* are fixed by slender stalks to the under surface of the pinnule whose reflexed margin forms the indusium. Each sporangium consists of a flattened, somewhat obovate sac. Its walls, consisting of a single layer of cells, are—with the exceptions given below—composed of pure cellulose. Extending vertically about two-thirds around the sporangium is the annulus. The walls which separate adjacent cells of the annulus, together with the floor of each cell, are much thickened and lignified, while the external wall, which curves over the edge of the sporangium in such a manner as to form a half cylinder, is a thin membrane of cellulose. In the remaining one- of the circumference, about midway between the end of the annulus and the stalk, are two narrow and elongated cells with thick lignified walls. It is between these two cells, along a definite line, that dehiscence always begins. That this is the point of greatest weakness is evident from the fact that if an unopened ripe sporangium be put into Schulze's macerating fluid, almost immediately, and before any other rupture is seen, these two lip-cells gape apart. The same result may be produced by strong potash. Moreover, the margins of the slit are clear cut, and never jagged, as if torn.



Ripe sporangium after expelling spores.

These two cells seem to have been overlooked hitherto, or to have been considered of no importance, for they are rarely represented in the cuts of fern sporangia, and dehiscence is described as taking place transversely, somewhere or anywhere between the end of the annulus and the neck. The constancy of this structure in the sporangia of the true ferns seems to indicate its importance. In the ferns mentioned below, I have found these modified cells, with slightly varying details of structure, and have

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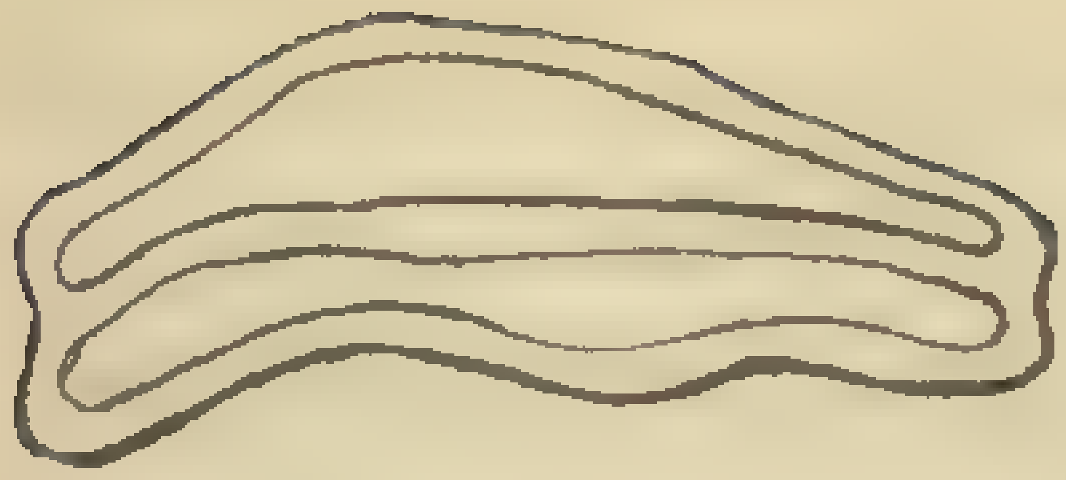
* Read before the Botanical Club, A. A. A. S., New York, Aug., 1887.

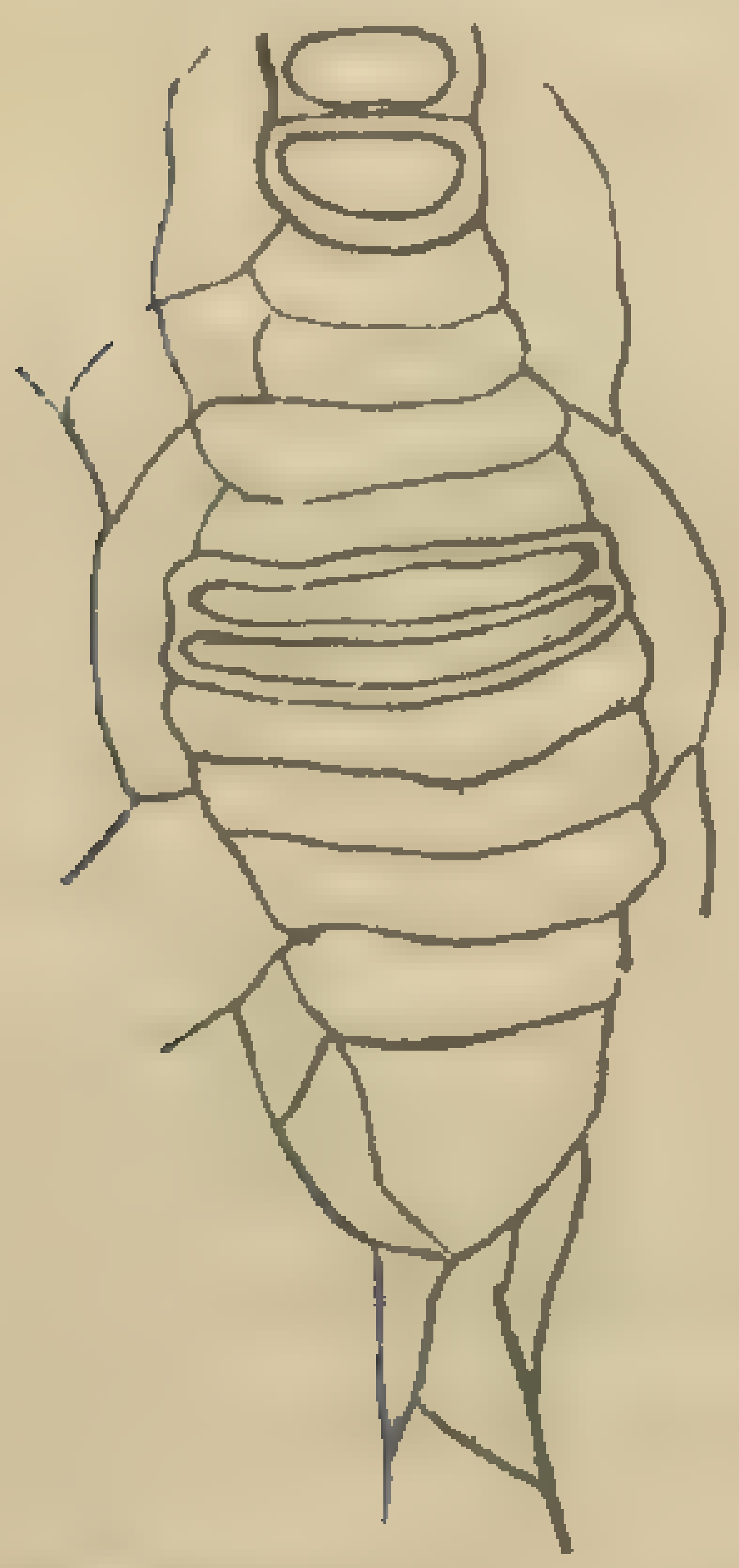


Front view of "lip cells."

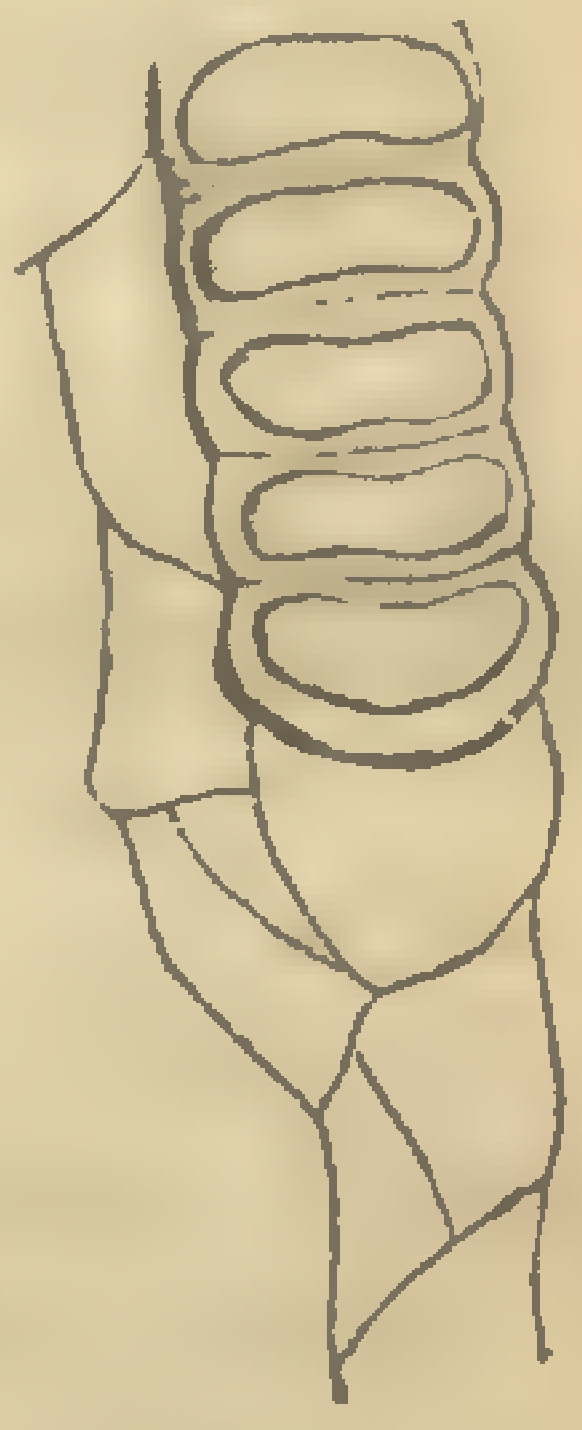
observed that dehiscence invariably begins by the clear cut between the lip-cells, and then continues as a somewhat irregular rent through the thin walls back to the annulus. The material from which the above results were obtained was preserved in alcohol. Fresh plants of *Adiantum Capillus-Veneris* and of *Pteris cretica* were obtained from the greenhouse, the remainder were dried specimens from the herbarium.

The species in which the lip-cells were observed are the following: *Adiantum Capillus-Veneris, Pteris cretica, Asplenium bulbiferum, A. Filix-fœmina, Aspidium Filix-mas, Polypodium vulgare, Scolopendrium vulgare, Woodwardia Virginica, Woodsia obtusa, Camptosorus rhizophyllus, Pellæa atropurpurea* and *Struthiopteris Germanica.*

Although in general the action of sporangia preserved in alcohol was satisfactorily studied, the results obtained remain to be verified from fresh specimens. If a sporangium be allowed to dry upon the slide, simultaneously with the appearance of the rent between the lips the annulus bends back until the ends nearly touch; then, with a quick jerk, it resumes its former position, expelling the spores by both movements. Then the annulus once more, but more slowly, straightens, generally coming to rest in an almost rectilinear position. The same phenomena may be observed more easily if the sporangium be placed in glycerine and the movements somewhat retarded by the pressure of the cover glass. As the annulus recurves the first time, the lateral walls of each cell, which in optical section appear like the letter U, approach each other, and the thin outer wall is pressed in so that the cavity of the cell is much diminished in size. At the



Front view of the portion of the sporangium lying between the stalk and the upper end of the annulus.



Portion of the annulus adjoining the stalk.

moment that the annulus returns to its original position, a bubble of air makes its appearance in each of its cells. The sporangium when in glycerine rarely comes to rest so widely open as when dry.

Now, first, what is the initial cause of the arching back of the annulus? Second, why does it return to its former position? Third, why does it finally assume the rectilinear position? The ordinary explanation is that the ring is elastic or hygroscopic. This is plainly unsatisfactory. It has been suggested by a late writer* that there is greater contraction of the thin external wall which thus pulls the annulus back. This explanation is disputed in a more recent paper by M. Leclerc du Sablon.† He argues that the external wall does not become tense as it would were it to contract more rapidly, but, on the contrary, sinks almost to the floor of the cell. Schinz offers still another solution, i. e., that the lignified walls are not homogeneous; that the inner layers contain more water and consequently contract more upon drying than the external ones, and that to this unequal contraction is due the initial movement of the annulus. M. du Sablon objects to this on the ground that if the annulus be separated from the sporangium and cut through lengthwise, each half ought to act precisely like the ring when intact. He claims to have made this section, but the half ring failed to contract. M. du Sablon's own explanation is substantially as follows: "The dry air surrounding the sporangium causes the water contained in the cells to evaporate. The pressure of the surrounding medium is greater than the pressure inside the cells, and the delicate external wall is pushed in, which accounts for the concave appearance. The cells of the entire annulus being thus depressed, cause it to straighten and curve backward." So far we can offer no criticism, although the explanation is purely hypothetical. He explains the return movement, however, in a very unsatisfactory manner. He believes it to be caused by the sudden formation of bubbles of air in the row of cells constituting the annulus, which, according to his belief, increase the internal pressure sufficiently to restore each cell to its original size, and thus throw the ring back to its original position. He thinks the bubble is formed of the air contained in the cell sap. If this be the case, as the amount of air is a very small per cent. of the cell contents, even should it expand, its pressure could not be so great as that of the surrounding denser air. It is difficult, moreover, to understand why the air in the cell should expand, as there is no diminution of external pressure nor any rise of temperature. The third movement he accounts for by the further evaporation from the cells.

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* SCHINZ.—Untersuchungen über den mechanismus des Aufspringens der Sporangien und Pollensäcke. Zurich, 1883.

† Recherches sur la dissemination des spores chez les Cryptogames vasculaires. Ann. des Sci. Nat., Sér. VII., Tom. II.

A clear explanation of the causes which produce the dehiscence in the fern sporangia remains to be worked out. The presence of the lip-cells here described, of the existence of which M. du Sablon's figures and descriptions give no recognition, may prove an important factor.

BOTANICAL LABORATORY UNIVERSITY }
OF MICHIGAN, June, 1887. }

[For other notes on this subject see the BULLETIN xiii, p. 168, ; Ber. Deutsch Bot. Gesell., iv, p. 42 ; Journ. Roy. Mic. Soc. 1886, pp. 828 and 1020 ; 1887, p. 662 ; and Flora, lxx, (1887) pp. 177, 192, 202-208.—ED.]

Notes on the Flora of Cayuta Creek.

Being stationed for a few weeks at Waverly, N. Y. (Tioga Co.), near the mouth of this stream, I determined to work up its bed and shed as far as possible, it being an especially interesting locality to me, as it geographically connects my work in Broome Co. with that of Dr. Lucy in Chemung Co., and of Prof. Dudley in the Cayuga Lake Basin. This little rivulet, having its source in a small lake by the same name situated a little south of east of the head of Seneca Lake and between it and Cayuga, flows southeast for half its length and then mainly south to its junction with the Susquehanna river, just across the Pennsylvania State line, a little east of the center of the southern tier of counties. This stream is about 35 miles long, flows through a narrow valley whose hillsides are mostly cleared and form fine farm lands, and forms a natural county line between Schuyler and Tompkins on the north, and Chemung and Tioga on the south.* Thus far we have only explored the creek from its mouth to "Bingham's Sta.," a distance of about eight miles, yet these few notes will show how peculiarly this region forms the true boundary of that portion of the State termed in geographical flora, "Western New York."

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* Those who are fortunate enough to possess Prof. Dudley's "Cayuga Flora," will find a quite faithful map of this location as a frontispiece.

Archemora rigida, DC., was found about two miles north of the State line. This is the farthest eastern station for this species that we know of; * the individuals differ from the western in having regularly, finely, and closely serrate leaves (not found in Broome Co., nor in the Cayuga basin. Dr. Torrey reports the plant in "western part of the State, rare.")

Oxalis violacea, L., occurs near the mouth of the creek, and about three miles up the stream. This violet-like beauty grows in the alluvium of the creek, in swales where leaves have accumulated and decayed; not on rocks, its usual habitat. (Not found in the Cayuga region, nor as yet in Broome Co.)

Polemonium reptans, L., found near the mouth of the creek, and by Mr. F. V. Coville about three miles north. At the first named station quite a large patch was found intimately associated with *Asarum Canadense* on the alluvial bank of the creek under the shade of a large sugar maple and a clump of *Neillia opulifolia*. (Dr. Torrey, on the authority of Dr. Bradley, reports the plant in Cattaraugus Co. Not found in the Cayuga nor Broome regions.)

Euphorbia corollata, L., a few individuals found on "Spanish Hill," near the mouth of the creek, but full and typical. (Not mentioned in the "Cayuga Flora," still we found a large growth of this species, in 1880, about a mile from McLean, N.Y., within the limits of that region; not found in Broome Co. Dr. Torrey, in New York State Flora, reports the plant, on the authority of Dr. Knieskern, as being found on the rocky banks of the Chemung river; our station, "Spanish Hill," is between this river and Cayuta Creek. We have no knowledge of the plant in Chemung Co., though Dr. Lucy may still report it.)

Asclepias tuberosa, L, "Spanish Hill." (This species is uncommon along the southern tier; we have met with it in Chemung Co., but not in Broome. Prof. Dudley marks it "frequent" in the Cayuga region, especially upon the east shore of the lake.)

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* Both this species and its var. *ambigua*, Gray, occur in eastern New Jersey and on Staten Island, and the type is found also on Long Island.—Eds.

Iris pseudacorus, L. This beautiful, sparingly cultivated European flag, grows in a large patch (about ¾ acre), remote from dwellings, about three miles up the creek, from whence it has become scattered down the stream, here and there, to its mouth, and thence on the right bank of the Susquehanna for about a mile. The farmers living near the original growth all assert, in answer to our questions concerning the origin of the station, that, as far as they knew, "it's alwus ben thar." (Marked "scarce" in "Cayuga Flora," where three stations are given; not found in Chemung or Broome Counties.)

Dioscorea villosa, L. This plant was first detected here by Mr. F. V. Coville; we have since found it at his station and in a few other places along the creek banks. (Found also in a few localities in Broome and Chemung Counties, but not in the Cayuga region.)

Hydrangea arborescens, L. Found in two places within the first four miles of the creek; also located here by Mr. Coville on his trip. (This is one of the plants that Dr. Torrey says "probably grow in the western district of the State of New York." Dr. Lucy has met with it in one station, "The Narrows" of the Chemung river, near Wellsburg, Chemung Co.; it is not found in the Cayuga region, nor in Broome Co.)

Arisæma dracontium, Schott.; *Flœrkea proserpinacoides*, Willd., and *Nyssa multiflora*, Wang., were located here by Mr. Coville, whose stations we have not yet had an opportunity to visit. (Broome Co. affords only the last named; Cayuga has all, and Chemung the first and last.)

Lobelia spicata, Lam., is quite plentiful on "Spanish Hill," where several individuals exist with pure white flowers. (Plentiful in Broome Co.; not found in the Cayuga region, and of Chemung we are uninformed.)

Quercus ilicifolia, Wang., is found on the hills west of the creek, and north of Waverly near the creek. (Not found in Broome Co., nor in the Cayuga region; Chemung Co.?)

Campanula rotundifolia, L. One of the most beautiful plants we have met this season was an individual of this species two feet high, with a profusion of pure white flowers. The species grows tall and profuse on "Spanish Hill," both in the open woods and over the grassy fields, and averages much larger and more vigorous than in rocky places north, its true habitat, according to authors. (Found in Cayuga region, but not as yet in Broome Co.)

Thaspium barbinode, Nutt., occurs in two localities along the creek, in one of which Mr. Coville also met with it. (Dr. Torrey mentions the plant, on the authority of Dr. Knieskern, as being found in the valley of the Chemung; and Dr. Gray reports it in "Flora of New York," from the Canadian side of Niagara river. The species has not been found in the Cayuga region, nor in Broome Co.)

Cerastium vulgatum, L. Found on the banks north of the reservoir supplying the village of Waverly. (Found also on "House's Hill," Broome Co.; not in Cayuga Flora.)

Aralia spinosa, L. One individual found on a dry gravelly bank of the creek, near its mouth, on the New York side of the State line. Though this plant grows in a wild place, at a long distance from any habitation, still it may be escaped, though we are fully convinced that it is natural. It is small, and either young or of stunted growth. (This is the only station to my knowledge in the State.)

A number of other species, that are not exactly rare, but of quite infrequent growth along the southern tier of counties, are *Triosteum perfoliatum*; *Polygonatum giganteum*; *Salix humilis*; *Juglans nigra*; *Dirca palustris*; *Monarda didyma*; *Verbena hastata*, var. *paniculata*; *Nymphæa odorata*; *Cynoglossum Virginicum*; *Mertensia Virginica*; *Lysimachia thyrsiflora*; *Tragopogon pratensis*; *Dipsacus sylvestris*; *Gillenia trifoliata*; *Vicia Americana*; *Lathyrus venosus*; *Acer saccharinum*, var. *nigrum*; *Linum Virginianum* and *usitatissimum*; *Polygala Senega*; *Helianthemum Canadense*; *Gentiana Saponaria* and *quinqueflora*; *Fraxinus pubescens*; *Chimaphila maculata*; *Cnicus arvensis*, var. *albiflorus*; *Taxus Canadensis*; *Hypericum Ascyron*; and *Ranunculus multifidus*.

C. F. MILLSPAUGH.

Note on the Flora of the Kittatinny Mountains.*

In November, 1884, I communicated to the Torrey Club an account of some peculiarities of the Flora of the Kittatinny Mountains of Northwestern New Jersey.† I then called attention to the existence on these mountains of a number of plants whose ordinary habitat is in sandy soil near the Atlantic coast, and whose occurrence in the region under consideration was apparently attributable to the highly silicious character of the soil, which results from the decay of the sandstone and silicious conglomerate rock of Oneida age—the Shawangunk Grit—of which these mountains are composed. Among the species then noted were *Juncus Greenii*, Oakes and Tuckerm., *Solidago puberula*, Nutt., *Orontium aquaticum*, L., *Tephrosia Virginiana*, Pers., *Lespedeza hirta*, Ell., *Lupinus perennis*, L., *Quercus ilicifolia*, Wang., and the *Corema Conradii*, Torrey, of Lake Mohunk, the latter a few miles north of the New Jersey line in New York, but on the same mountain range. Since that time I have been able to make further exploration of the region and can furnish additional support to the position then taken.

At Culver's Gap, the first break in the range to the southwest of the depression through which the Erie railway is constructed, the conglomerate is well exposed, and here *Polygala polygama*, Walt., *Gerardia pedicularia*, L., and *Lechea racemulosa*, Michx., all abundant in sandy soil along the coast, occur plentifully. Here also grew *Prunus pumila*, L., before noted at High Point, and more commonly found on sandy river shores, though not a coast plant. On the mountains northwest of the Delaware Water Gap, I found, on July 4 of the present year, *Scleria pauciflora*, Muhl.

But the most interesting spot yet visited is a lake of some 200 acres in extent, called Sunfish Pond, four miles northwest of the Water Gap, near the very summit of the mountain. In shallow water along its shore, *Juncus militaris*, Bigel., was found. This species has never before been found so far away from the coast. The capillary sub-aqueous leaves had, at the time of collection

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* Read before the Biological Section, A. A. A. S., New York Meeting, August, 1887.

† Published in the BULLETIN of that month. vol. xi., pp. 126–128.

(July 5), become detached from the plants, but were seen floating and cast up on the shore; it had not yet come into flower. *Lycopodium inundatum*, L., occurs in wet sand on the shore; the plant regarded by Professor Tuckerman as var. *Bigelovii* of this species, is very plentiful in sandy bogs in eastern New Jersey, and differs from the northern and European plant mainly in its greater size; *Viburnum nudum*, L., was collected near by, and its var. *cassinoides*, Gray—for I cannot regard it as a species—grows at Lake Nascia near High Point. *V. nudum* is common in coast swamps.

Aster linariifolius is abundant all along the mountains, as in the sandy coast plains, while the almost impassable thickets of *Quercus ilicifolia*, Wang., make traveling difficult and often painful. The resemblance to the pine barren flora is also markedly apparent in the great abundance of Ericaceæ. *Gaylussacia resinosa*, Torrey & Gray, *G. frondosa*, Torrey & Gray, and *Vaccinium vacillans*, Sol., are all common to both regions and equally very abundant, while *Epigæa repens*, L., *Gaultheria procumbens*, L., whose habitat is not always "cool, damp woods," *Cassandra calyculata*, Don., and *Rhododendron viscosum*, Torrey, occur as well.

The floral resemblance here traced bears no relation to the geological age of the two regions, the coast plains being late Tertiary or Quaternary, the mountains Silurian. But there is another range of mountains parallel to the Kittatinnys in New Jersey and southern New York, whose flora has many species in common with that of the latter. I refer to the ridges of the Green Pond System, known at Greenwood Lake as the Bearfort and Bellvale Mountains and in New York as the Skunnemunk. Here *Quercus ilicifolia*, the Blueberries and Huckleberries are very abundant; *Solidago puberula*, *Tephrosia*, *Lespedeza hirta*, *Arctostaphylos Uva-Ursi*, *Aster linariifolius* and other sand plants occur. The rock is a silicious conglomerate much resembling that of the Kittatinny, and was supposed by Mather, while prosecuting the Geological Survey of New York, to be of the same age, though his observations did not fully demonstrate the fact. Others have regarded these Green Pond Mountain conglomerates to be of several different ages, ranging from Potsdam to Triassic, but the recent field-work of Mr. F. J. H. Merrill leaves little doubt that they are what Mather supposed, and we have here a most interesting agreement of the floral features with the lithological.

N. L. BRITTON.

A Meeting-place for two Floras.*

BY CHARLES E. BESSEY.

About half-way across the northern part of Nebraska, a few miles east of the 100th meridian, there is a very interesting botanical locality. A small stream starts at a point about twenty or twenty-five miles south of the Niobrara River, and runs northward through a deep and winding cañon to the river mentioned. The surrounding country is absolutely treeless, and the surface is in many places thrown up into rounded hills of what must have once been drifting sand. The cañon sides are very abrupt, and they descend in many places fully two hundred feet before the bottom is reached. The stream is known to the whites as Long Pine Creek, but to the Indians it was the Wasahancha, which signifies "where the pines extend far out." Both names refer to the pines which have here a station so far removed from the mountains as to have attracted the attention of the Indians, as well as the early white settlers.

In this cañon, as I found in a recent visit, there is a blending of the Eastern and the Western floras in a most unusual way. The first thing that strikes the visitor is the fact that here are growing great numbers of Rocky Mountain pines (*Pinus ponderosa*, var. *scopulorum*). They are so abundant, and of such size that they are largely used in the neighborhood for lumber and for fuel. Subsequent examination of the country around shows that these pines are found along the streams or on the hills all the way up to the mountains of Wyoming, and they appear also to be connected with the heavy body of pine in the Black Hills in Dakota. There are none, however, eastward of this cañon, although the sides of the broad cañon of the Niobrara river, near the mouth of the creek, are dotted with scrubby pines. The Indian name of the creek—the Wasahancha—is therefore most appropriate; "where the pines extend far out."

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* Read before the Botanical Club, A. A. A. S., at the N. Y. Meeting, August, 1887.

By referring to Professor Sargent's volume upon the "Forestry of the United States," in the reports of the Tenth Census, we find that the pine in question ranges from the far West into the Rocky Mountain region, and that its easternmost station is given as the Black Hills of Dakota. We must now add northern and northwestern Nebraska to the region covered by it, with Long Pine Creek (Wasahancha) as its eastern limit.

Much as I was surprised at the presence of the Rocky Mountain Pine in this locality, I was much more so at finding large trees of Black Walnut (*Juglans nigra*) growing in the cañon by the side of the pines. The walnut is still very common, and was formerly so abundant that a good many thousand feet of walnut lumber were manufactured from the logs. The western range of the Black Walnut is given by Sargent as "through southern Michigan to southern Minnesota, eastern Nebraska, and eastern Kansas." I doubt whether there is any other place on the continent where the Black Walnut and the Rocky Mountain Pine grow normally side by side. I could not trace the walnut further west, and have little doubt that this is its westernmost station, or very nearly so. It does not occur at Valentine, near Fort Niobrara, fifty miles to the westward.

The Ironwood (*Ostrya Virginica*) was another surprise to me. At Long Pine it is very abundant, and so I found it at Valentine, and when a few days later I clambered through the cañons in the vicinity of Rapid City in the eastern Black Hills of Dakota, I still found it, although Sargent gives its entire limit as "through eastern Iowa, southeastern Missouri, and Arkansas to eastern Kansas, the Indian Territory, and eastern Texas." Coulter does not include it in the "Rocky Mountain Botany."

The only oak in northwestern Nebraska appears to be the Bur-Oak (*Quercus macrocarpa*), and instead of being the normal form, it approaches the little Mountain Oak (*Q. undulata*). The trees at the eastern stations (Long Pine and Valentine) are frequently large, 30 to 50 feet high, but as we go west—Chadron, Fort Robinson and the Black Hills—they are smaller; in all cases, however, the cup is but little fringed, showing in this a strong tendency to the mountain species (*Q. undulata*).

The Choke Cherries, from Long Pine westward, are mostly of the mountain species (*Prunus demissa*), and are large and edible. Whenever I could do so, I always collected a handful of them, for eating, as I pursued my search for plants. At one house where I stopped for dinner, I was treated to choke cherry pie, which was very palatable indeed! The species at Long Pine is identical in every respect with that found in abundance in the Black Hills, and at Fort Robinson near the line between Nebraska and Wyoming.

The Golden Currant (*Ribes aureum*) is another mountain species which extends eastward to Long Pine. I found it fruiting profusely. Likewise, the pretty little shrub, *Rhus aromatica*, var. *trilobata*, is another westerner which I noted in full fruit in this famous cañon.

There are many other plants which show that here the two floras meet and overlap, but these given are probably the most striking.

Index to Recent American Botanical Literature.

Absorption of Aniline Colors by living Cells.—Douglas H. Campbell. (Bot. Gazette, xii., pp. 193, 194.)

Andromeda floribunda.—Pursh. (Garden, xxxi., p. 612; illustrated.)

Asperifoliæ—Some West American, II.—Edward L. Greene. (Pittonia, i., pp. 55-60.)

The new classification of certain Borraginaceous plants, proposed by Professor Greene, institutes two new genera, viz.: *Oreocarya*, of nine species made up from *Eritrichium* and *Krynitzia*, and *Eremocarya* of two species, both included by Dr. Gray in *Eritrichium*. *Piptocalyx* of Torrey is restored to generic rank and given two species—the original *P. circumscissus* and *P. dichotomus*, Greene.

Asa Gray. (Gard. Chron., ii., June 25th, '87, pp. 836, 837.) (Bot. Gazette, xii., p. 203.) (Gard. Month., xxix, p. 252.)

All give notices in full of the various degrees and honorary orations delivered at Oxford, Cambridge and Edinburgh in his honor during the month of June. They are particularly happy in their sentiment and warm in their praise. He was pronounced with the degree of Doctor of Science from Cambridge, "Floræ sacerdos venerabilis"; and at Oxford with a D.C.L., "Moribus suavissimis veritatisque semper quam famæ propriæ studiosior."

Auxanometer—A simple and inexpensive self-registering.—Hermon C. Bumpus. *A registering Auxanometer.*—Charles R. Barnes. (Bot. Gazette, xii., pp. 149-152; two plates.)

Botany of San Miguel.—Edward L. Greene. (Pittonia, i., pp. 74-93.)

The island of San Miguel is the most western member of the archipelago lying off the coast of southern California, whose flora has received so admirable an exposition at the hands of Professor Greene, Mr. Lyon and others. It is a table-land 200 to 300 feet high, rising at points, however, to elevations of over 800 feet. There is little arboreous vegetation, but evidence is adduced to show that *Rhus integrifolia* was abundant not long ago, as its wood is still found in sufficient quantity to furnish a fuel supply to the fishermen and seal-hunters who visit the island. The bulk of the vegetation is composed of strictly insular species, while the most abundant plant is *Mesembrianthemum crystallinum*, which Prof. Greene believes to be indigenous here, as in South Africa. "A Catalogue of the Flowering Plants of the Island" enumerates 120 species and varieties.

Cactuses in Arizona. (Gard. Chron. ii., p. 17; illustrated.)

Chionanthus Virginica. (Vick's Ill. Month. Mag., x., p. 227; one figure.)

Collinsia—A curious.—Edward L. Greene. (Pittonia, i., pp. 52-55.)

Professor Greene records the occurrence of regular corollas on *Collinsia bicolor*, the plant thus showing affinity to Nuttall's genus *Tonella.* He maintains that the genera are not distinct, and refers *T. floribunda*, Gray, to the older genus; *T. collinsioides*, Nutt., is already *Collinsia tenella*, Bentham.

Coloring the Nuclei of living Cells.—Douglas H. Campbell. (Bot. Gazette, xii., pp. 192, 193.)

Mr. Campbell has succeeded in accomplishing this process with several different aniline dyes during his work in the laboratory at Tübingen.

Cortical Peculiarities in the Plum.—Thomas Meehan. (Proc. Acad. Nat. Sci., Phila., 1887, advance sheets.)

Cypripedium pubescens and C. spectabile. (Vick's Ill. Month. Mag., x., p. 217; colored plate.)

Desiderata of the Herbarium of the Department of Agriculture for North America, north of Mexico, Ranunculaceæ to Rosaceæ inclusive.—Geo. Vasey. (Dept. Agric., Bot. Division, Bull. No. 4, pamph., 8vo., pp. 15, Washington, 1887.) ✓

Fungi—A List of Works on North American.—W. G. Farlow and William Trelease. (Bibliog. Contrib. Library of Harvard University, No. 25, pamph., pp. 36, Cambridge, 1887.)

We are pleased to chronicle the completion of this great piece of work, the first part of which we noted a few months ago. About 645 titles are given, and the list is undoubtedly as complete as such lists can be made on the first attempt, for we have no doubt that these industrious authors will come across a few more articles every year for some time to come. Not the least interesting feature is the arrangement of births and deaths of authors cited, by which we are enabled to ascertain the age of everyone who has had anything to do with our Fungi.

Fungi of Illinois—Parasitic, II.—T. J. Burrill and F. S. Earle. (Bull. Ill. State Lab. Nat. Hist., ii., pp. 387-432.)

The first paper of this series gave an account of the Illinois *Uredineæ;* the third and fourth will be devoted to the *Peronosporeæ* and *Ustilagineæ.* The authors of the *Erysipheæ* have studied the group for many years, and Mr. Earle has given them his special attention in both field and laboratory. Two species and twelve hosts of other species were collected in the State by him alone. The description of the group is followed by an account of the development and notes on the classification. Very good figures illustrating the six genera accompany the key to the genera. The descriptive portion is followed by an index of species and of host plants.

Twenty-eight species are described: *Sphærotheca,* 5; *Erysiphe,* 4; *Uncinula,* 6; *Phyllactinia,* 1; *Podosphæra,* 1; *Microsphæra,* 11. The nomenclature is in harmony with that adopted for the *Uredineæ,* and conforms as far as may be to that of Winter in the Kryptogamen Flora. *Sphærotheca mors-uvæ* (S.) B. & C., is kept separate from *S. pannosa,* to which it has been referred. The form on *Agrimonia* is referred to *S. humili* (DC.), Burrill.

Erysiphe liriodendri, Schw., is fully described for the first time. All mycologists will doubtless be pleased to find the troublesome *Erysiphe Martii* referred, for reasons stated, to *E. communis*. *E. cichoraceorum* DC. (=*E. lamprocarpa*), is recorded as occurring on twenty-nine hosts.

Uncinula spiralis, B. & C., is referred to *U. ampelopsidis*, Pk. The former name has priority to the latter and should have been adopted. It was first published with a figure in Berkeley's Cryptogamic Botany. *Uncinula circinata*, C. & P., which usually grows on *Acer rubrum*, is here given only on *A. saccharinum*. This and *Microsphæra semitosta* were collected only by Mr. M. B. Waite, who is now a botanist of the State Laboratory. *Uncinula salicis* (DC.) Wint., includes the forms on both *Salix* and *Populus*.

Under *Podosphæra oxyacanthæ* (DC.) De By., are included the forms recognized in Europe under that name, *P. tridactyla* and *P. myrtillina*. The American specimens show intermediate forms uniting them all.

Microsphæra alni (DC.) Wint., includes a number of forms that have stood as species until now, though always troublesome, and recognized by little besides the host. They are: *M. pulchra*, *platani*, *Van Bruntiana*, *viburni*, *Hedwigii* and *Friesii*, in addition to *M. penicillata*. *Microsphæra quercina* (Schw.), Burrill, receives the forms on oaks formerly known as *M. extensa* and *M. abbreviata*.

The names mentioned above are the principal ones reduced to synonyms, and the number of species is thus diminished by twelve. Botanists have long felt the need of such a step, and the abundant material and years of study have enabled the authors to do it well. A. B. S.

Flora Ottawaensis—Additions to the. (Ottawa Nat., i., p. 77.)

Two indigenous species and four colonists are reported, additional to previous lists.

Germination of Cucurbitaceous Plants.—Byron D. Halsted. (Agric. Science, i., pp. 149-154.)

Gymnogramme triangularis, Kaulf. (Garden, xxxii., p. 44; illustrated.)

Halesia tetraptera, L. (Garden, xxxi., p. 520; illustrated.)

Halesia tetraptera—*The Silver Bell or Snowdrop Tree.* (Vick's Ill. Month. Mag., x., pp. 195, 196; two figures.)

Horticultural Terminology.—L. H. Bailey, Jr. (Amer. Garden, July, 1887.)

Professor Bailey calls attention to the erroneous use of several botanical terms.

Hunnemannia fumariæfolia, Sweet (Mexico). (Garden, xxxi., p. 536; colored plate.)

Linaceæ—A Revision of North American.—William Trelease. (Trans. St. Louis Acad. Sci., v., pp. 7-20, two plates; also reprinted.)

Professor Trelease has made a critical study of our flaxes, with a view of revising them for the coming volume of the Synoptical Flora. His arrangement of the species is prefaced by some historical notes and others on homogony and heterogony of the flowers, our indigenous species being all homogone. It appears that we have as introduced species both *L. usitatissimum*, L., and *L. humile*, Mill., the latter to be distinguished by its dehiscent capsule with ciliate septa. *L. Floridanum*, n. sp. is the *L. Virginianum*, var. *Floridanum*, Planch.

Lower Californian Plants—Notes on.—C. R. Orcutt. (West Amer. Sci., iii., pp. 139, 140.)

A list of species collected by Mr. Lopatecki with the Spanish names, which, as Mr. Orcutt remarks, add considerably to its value.

Oaks of Southern and Lower California.—C. R. Orcutt. (West Amer. Sci., iii., pp. 135-139; illustrated.)

An instructive account of the distribution of the nine species of *Quercus* native to the region.

Phacelia Whitlavia. (Vick's Ill. Month. Mag., x., p. 228; colored plate.)

Philadelphus microphyllus. (Vick's Ill. Month. Mag., x., p. 250; one figure.)

Picea nigra, Link— *The Black Spruce.* (Garden, xxxii, p. 47.)

Podosphæra minor, Howe, and Microsphæra fulvofulcra, Cooke—The Identity of.—Martha Merry. (Bot. Gazette, xii., pp. 189-191; one plate.)

Pseudotsuga Douglassii, Carr.—*The Douglass Fir.* (Garden, xxxii., pp. 95, 96.)

Ptelea trifoliata, L. (Garden, xxxi., p. 566.)

Roses Américaines—Nouvelles Remarques sur les.—François Crépin. (Comptes-Rendus, Soc. Roy. Bot. Belg., 1887, pp. 43-52.)

M. Crépin's paper is in effect a critical review of Dr. Watson's Revision of the North American Roses, in the 20th volume of the Proceedings of the American Academy; he differs from our American authority in some points, while on others they are agreed. M. Crépin thinks *R. lucida* and *R. nitida* need more study, but regards *R. humilis* as easily distinguishable. He doubts the distinctness of several West American species, and appeals to American botanists to send him specimens, saying that our aid is indispensable in closing the monograph to which he has devoted so many years of study. We trust that M. Crépin's request will not be neglected.

Sabbatia campestris, Nutt., (Garden, xxxi., p. 509; illustrated.)

Septorias of North America—Enumeration and Description of the.—George Martin. (Journ. Mycol., iii., pp. 37-94.)

This enumeration, which has been continued through several numbers of the Journal, is now completed. It includes 188 species of *Septoria*, 8 of *Phleospora* and 20 of *Rhabdospora*, 8 of *Phlyctæna*. A complete index to species and host plants is given.

Species—New or rare.—Edward L. Greene. (Pittonia, i, pp. 60-74.)

We find here described *Eschscholtzia maritima* from the island of San Miguel, very interesting and important from its affinity to *Hunnemannia; Streptanthus albidus*, *Thelypodium rigidum*, *Silene simulans*, *Lepigonum tenue*, *Calyptridium nudum*, *Lupinus Franciscanus* and *L. pachylobus*, *Trifolium filipes*, *Rhamnus rubra*, *Ribes amictum*, *Œnothera nitida*, *Cnicus amplifolius*, *Troximon elatum*, *Gilia mellita* and *G. parvula*, *Pentstemon leucanthus*, *Muilla transmontana* and *Hookera leptandra*. There are also interesting notes on *Carpenteria*, in which Prof. Greene finds close affinity to *Philadelphus*, and on *Stachys Californica*, Benth., which he well distinguishes from *S. bullata*.

Spirogyra under Shock.—Stanley Coulter. (Bot. Gazette, xii., pp. 153-157; five figures.)

Sophora secundiflora—Fasciation in.—George Vasey. (Bot. Gazette, xii., pp. 160, 161; one plate.)

Thuya gigantea, Nutt. (Garden, xxxi., p. 615.)

Vegetable Parasites and Evolution.—W. G. Farlow, M.D. (Advance Sheets from the Proceedings of the A. A. A. S., Vol. xxxvi; 19 pages.)

It was a pleasant surprise to receive the vice-president's address in pamphlet form the same day that it was given and to find it reprinted entire in the Botanical Gazette (Vol. xii., pp. 173-189), ere a week had elapsed since the close of the meeting. It is difficult to put in a few words the exact scope of this most interesting essay; suffice it is to say that after stating that zoölogists have gone farther than botanists in their efforts to explain the evolution of higher forms from lower, owing to the fact that the palæontological record of lower animals is more complete than that of lower plants, the author proceeds to define the term parasite, illustrating from the Phanerogams the Algæ and Fungi, including a long discussion of symbiosis and the algo-fungal theory of Lichens and Frank's Mycorhiza, and concluding with a few theories on the origin of vegetable parasites.

White and Yellow Poplars.—H. A. Evans. (Bot. Gazette, xii., pp. 165, 166.)

Mr. Evans presents evidence to show that the white and yellow wood of *Liquidambar* is not produced by different varieties, but by trees of different ages, the older being yellow.

Yucca brevifolia. (Gard. Chron., i., p. 772; illustrated.)

The statement is made that the London Telegraph is supplied with paper made from this Californian species.

Zannichellia palustris, L.—F. W. Anderson. (Bot. Gazette, xii., p. 192.)

The species is reported from a spring near Great Falls, Montana.

Botanical Notes.

Henry William Ravenel, LL.D. Born at Berkeley, S. C., May 19th, 1814; died at Aiken, S. C., July 17th, 1887.

Though most of his life was spent in his native State yet his work in Cryptogamic Botany covered the flora of the Southern States, and in Fungi and Mosses was practically the first in that region. He was the the first to issue a set of American Fungi, "Fungi Caroliniani Exsiccati" (1853-1860), and later with M. C. Cooke, the "Fungi Americani Exsiccati" (1878-1882) were published in eight centuries, collected mostly in the Southern States. Dr. Ravenel's abilities and researches were perhaps better known in Europe than in America, and he had an extensive correspondence with Berkeley, Fries, Montagne, and was a member of the Zoölogische Botanische Gesellschaft, the Academy of Natural Science of Philadelphia, and was botanist to the Department of Agriculture of South Carolina at the time of his death. His herbarium, which is practically the only legacy that he leaves his family, contains many type specimens and many well authenticated by M. A. Curtis, Berkeley and others. A full list of his works, as given by W. G. Farlow, will be found in the Botanical Gazette, xii., pp. 194-197.

Swedish Linnæan Monument Association. It is proposed to erect in Lincoln Park, Chicago, Ill., an exact counterpart of the statue of Linnæus recently unveiled in the Royal Gardens at Stockholm. Several meetings have been held by the above named association, at which definite arrangements have been made for carrying on the work. The estimated cost of the statue is $30,000, and subscriptions are solicited from all botanists in the United States.

The Tubercular Swellings on the Roots of Leguminosæ. H. Marshall Ward (Proc. Royal Soc., xlii., p. 331), Preliminary Note. "The author finds that the tubercles on the roots of the Leguminoseæ are due to the action of a parasitic fungus. Not only has he produced the tubercles by infection from without, but he has also found the infecting agent, and repeatedly seen and figured the infecting hypha passing down inside a root-hair and across the cortex of the root into the young tubercle. Here the hyphal branches bud off yeast-like cells, which are extremely minute and numerous, and resemble bacteria at first sight; they differ in their mode of multiplying by budding."

"The action of these minute germ-like bodies causes the protoplasm of the cells of the root to assume plasmodium-like characters, and induces the flow of nutritive substances to these cells, and hypertrophy results. On the decay of the tubercle, the germ-like bodies pass into the soil (where they can always be found) and infect other roots; it is very probable they may be of extreme importance in agriculture."

Tubercles on the Roots of Leguminosæ.[*] (Journ. Roy. Mic. Soc. 1887, p. 610.)

The studies conducted by A. Tschirsh lead him to the conclusion that they occur on all species of this order, always on the roots; that they are storage organs for nitrogenous matters previous to the ripening of the seeds, and attain their maximum development when the plant is in flower. They are of two kinds, the *Lupinus* type and *Robinia* type.

Tubercles on the Roots of Alder and Elæagnaceæ.[†] (Journ. Roy. Mic. Soc. 1887, p. 611.)

B. Frank has modified his previous views as to their nature and differs entirely from those who regard them as due to parasitic fungi; they prove to be accumulations of newly formed albuminous substances and are therefore identical with those on the Leguminosæ. "The alleged parasitic fungi *Schinzia Alni*, *S. Leguminosarum*, *Plasmodiophora Alni*, and *Frankia subtilis* must therefore be erased from mycology."

Proceedings of the Club.

A meeting was held on Tuesday evening, August 9th, 1887, in Hamilton Hall, Columbia College, President Newberry in the chair, and forty-five persons present. Among the visitors were many members of the American Association for the Advancement of Science. In the absence of the Secretary, Dr. N. L. Britton was elected Secretary *pro tempore.*

Mrs. Cornelius Van Brunt, Mr. C. S. Boyer, and Jacob J. J. Gress were elected Active Members.

The Secretary read a letter from Dr. George Vasey calling attention to the fact that the United States Government has done nothing for botanical exploration for many years; stating also that the Herbarium of the Department of Agriculture is wanting in many things that can only be procured by special effort. On motion, the President appointed a committee, consisting of Messrs. Thomas Hogg, Jos. Schrenk and N. L. Britton, to draft resolutions expressing the desirability of making the Herbarium of the Department of Agriculture as complete as possible.

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[*] Ber. Deutsch. Bot. Gesell. v, (1887), pp. 58–98, (1 pl).

[†] Ber. Deutsch. Bot. Gesell. v, (1887), pp. 50–58, (1 pl).

Dr. Newberry remarked on the relations of *Pinus edulis*, Englm., and *P. monophylla*, Torr. and Frem., and referred to his former papers on the subject. (See BULLETIN, May, 1885, and October, 1886). He exhibited specimens collected by Marcus E. Jones at Lewiston, Utah, which show both the single and double needles on the same branch, proving that the species are not distinct, and that Sir Joseph Hooker's view is erroneous. (See Gardener's Chronicle, July 31st, 1886). Mr. Jones states in a letter accompanying the specimens, that some trees have about half the leaves double. and half single.

Prof. Schrenk exhibited specimens of *Halenia deflexa*, Griseb., from Coshecton, Sullivan Co., N. Y.

Dr. Rusby remarked on the use of botanical names by pharmacists, stating that many are merely trade names, and that there is often great difficulty in ascertaining what species is really meant. If it were practicable to insist that the author should always be cited, much confusion would be avoided. Mr. A. A. Crozier spoke of the same difficulty in tracing the names of cultivated, ornamental species.

Dr. R. E. Kunzé exhibited and distributed blossoms of *Cereus nycticalus*, Link., which were much admired.

Dr. Britton showed *Plantago Patagonica*, Jacq., var. *aristata*, Gray, collected by Rev. R. E. Schuh at Rutherford, N. J., where it is abundant in one locality. Prof. T. C. Porter stated that it formerly grew on the campus of Lafayette College at Easton, Pa., but has now disappeared. Mr. E. B. Southwick reported it from Riverside Drive, New York Island. Prof. Farlow had seen it at Wood's Holl, Mass.; and Prof. Claypole at Akron, Ohio. At all these stations it appears to be a mere waif.

Prof. Porter remarked on the occurrence of *Amphiachyris dracunculoides*, Nutt., at Easton, where it was introduced in hay from the West, and of *Blephilia ciliata*, Raf., near the same place. The method of introduction of the latter is not yet explained.

Prof. Claypole reported *Nelumbium luteum*, Willd., from Congress Lake, near Akron, Ohio. Dr. Newberry remarked on the dissemination of *Nelumbium* by the Indians, who used the seeds for food. Hon. D. F. Day spoke of its occurrence in Grand River, forty miles west of Buffalo, and said that Mr. C. E. Smith had informed him of a station for the plant on the northern shore of Lake Ontario. Dr. Farlow and Dr. Rusby spoke of the station at Osterville, Cape Cod. Judge Day remarked on the Mummy specimens of *Nelumbium speciosum*, Willd., in the museum of the New York Historical Society. Dr. Britton stated that he had recently been informed by Dr. C. C. Abbott that *N. speciosum*, Willd., had escaped from the grounds of Mr. Sturtevant at Bordentown, N. J., and was becoming naturalized in streams flowing into the Delaware River.

Mr. E. E. Sterns showed fruit of the Soapberry (*Sapindus marginatus*, Willd.), and remarked on its use as a substitute for soap. Dr. Newberry said that the most delicate fabrics may be washed with it without injury; he remarked further on other "soap-plants,"—*Yucca*, *Dasylirion*, *Agave*, etc., and stated that an attempt was being made in Mexico to utilize the parenchymatous tissues of some of these plants after the fibre had been separated for cordage.

Miss Steele exhibited a mounted set of the plants from the vicinity of New York, prepared by members of the Club for distribution to the visiting botanists of the A. A. A. S. In spite of the very unfavorable season for collecting, sixty-three species were obtained.

Dr. Newberry remarked on the geological history of *Liquidambar*, and showed a large number of drawings and specimens of Cretaceous and Tertiary species of this and other genera. In the ensuing discussion, Prof. Porter, speaking of the present distribution of the tree, said that there are a few individuals along the Delaware River, in northeastern Pennsylvania, but he had not observed any in the central portions of that State. Dr. Newberry had not met with it in Ohio, and Judge Day said it was not native in western New York. Dr. Kunzé called attention to the fact that the gum abounds in benzoic acid, and asked how far north the tree produced this gum, which appears to be difficult to obtain in commercial quantities.

The Club then adjourned till October 11th.

Proceedings of the Botanical Club of the A. A. A. S.,

New York Meeting, Aug 11th to 16th, 1887.

THURSDAY, AUGUST 11th,

In the absence of Mr. M. S. Bebb, the Chairman elect, Rev. Thomas Morong was called to the chair.

Prof. W. J. Beal read a paper on the character of the rootstock in *Leersia* and *Muhlenbergia*, illustrated by diagrams.

Prof. Volney M. Spalding read a paper prepared by Miss Florence May Lyon, entitled "Dehiscence of the Sporangium of *Adiantum pedatum*"* Prof. George Macloskie remarked that he had observed that when examined with a bulls-eye condenser, sporangia would burst and eject the spores to a distance of a yard or more, and attributed this action to heat. Prof. Joseph Schrenk referred to the paper by Plantl,† already reviewed by him in the BULLETIN, Vol., xiii p. 168.

A paper by Prof. Charles E. Bessey, entitled "A Meeting-place for two Floras,"‡ was read by the Secretary.

The Committee of the Torrey Botanical Club, which had in charge the collection of rarer plants of the vicinity of New York for distribution, announced that printed lists of the plants had been prepared and invited the members to select from these lists such species as they desired.

The following letter was read by the Secretary:

THE UNIVERSITY OF NEBRASKA,
DEPARTMENT OF BOTANY,
AUGUST 8th, 1887.

To the Members of the Botanical Club of the A. A. A. S.:

Allow me as an absent member of the Club to urge that action be taken looking to an improvement in the condition of the National Herbarium at Washington, D. C.

This action should refer to the following points, viz:

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* Ber. Deutsch. Bot. Gesell., iv, p. 42.

† See this BULLETIN, p. 189.

‡ See this BULLETIN, p. 180.

1. The importance of building up a great collection in the National Capital.

2. The fact that for many years the government surveys have practically ignored Botany, and that as a consequence there have been but few accessions from these sources.

3. The need there is of having systematic collecting and study of our native plants undertaken in various parts of the country, as is now done in the Division of Entomology.

4. The fact that much of such study and investigation would bear directly upon the agricultural problems of the country, and that for this reason (if for no other) Congress should make ample appropriations for such work.

5. A committee should be appointed to inquire into the present condition of Botany in Washington. Is there not a tendency to build up *two* feeble collections? Is there not something being done in the National Museum or the Smithsonian Institution? Now let a committee find out exactly what *has been done*, what *is* doing in all places in Washington and let it make a full and explicit report for publication in our scientific journals.

6. Let the Club urge a *consolidation of the botanical work* in Washington, in order that there shall not be a conflict of interests and a division of the limited means available.

I have no doubt that this suggestion will meet with opposition but I am convinced that the best interests of science demand such consolidation. Just how this consolidation should take place can only be determined by a careful study of the existing state of things in the National Capital.

Trusting that you will be able to take some decisive action,

I am, very truly yours,

CHARLES E. BESSEY.

The Chairman then called on Dr. George Vasey, who spoke at length regarding the subject introduced by Prof. Bessey.

To the Members of the Botanical Club:

It is a great pleasure to me to know that the Botanical Club has taken an interest in the work of Botany at the Department of Agriculture and in the Herbarium of the Department, particularly in the action taken at the meeting at Ann Arbor in 1885, in which a statement was desired of the contents of the Herbarium ; the number of its types ; the completeness of its preservation ; and its convenience for consultation. A reply to these inquiries was published in the Herbarium number of the *Botanical Gazette*, June, 1886. This reply could not at that time be made complete as to the number of species represented in the Herbarium, but the general statement was made that as to the phænogamous plants of the United States there was a representation of about 90 per cent. and that of foreign plants there was as great a number. Further investigation of our exotic species lead me to conclude that we have, of such, about 20,000 species.

It is known to some of you that besides the Herbarium of the Department of Agriculture there is a collection of plants at the Smithsonian Institution embracing particularly a large representation of the plants of Europe as well as many United States plants. This collection has its place there chiefly for convenient reference in the work of the Palæontological Botany of the Geological Survey, which is in charge of Prof. Lester F. Ward. There need be no apprehension in relation to this apparent duplication of the collections. They should rather be regarded as supplemental of each other.

With reference to the Herbarium of the Department of Agriculture, I wish further to say that a careful revision has been for some time in progress, and a list of desiderata from Ranunculaceæ to Rosaceæ inclusive has been prepared and sent to the printer, and I hoped to have it ready for distribution to the members of the Club at this meeting, but owing to a pressure of work it is not yet published. As soon, however, as it can it will be sent to the members of the Club.

It is known to some of those present that since my connection with the Department it has been my desire to make the Botanical Division useful as an aid, particularly to the Agricultural Colleges of the country, and to other scientific institutions as far as possible, and with this purpose I have made many distributions of sets of wood-specimens and of such duplicate plants as could be spared. But this service has been very small in comparison to what it might be under more favorable circumstances. For the last eight or ten years there has been no botanical work performed in connection with the Government Surveys, except some volunteer collecting by a few members of the Survey. Formerly it was the practice to have one or more Naturalists connected with the Surveys, and the botanical collections made were finally deposited with the Department of Agriculture. In this way the Herbarium was enriched and a stock of duplicates was accumulated. But since the abandonment of Natural History on the Surveys we have had to depend chiefly on a small appropriation with which the principal botanical collections of Palmer, Pringle, Lemmon, Howell and others have been purchased.

There is now urgent need for more government aid in the prosecution of the work of the Botanical Division. The interest which this Club and the American Association has taken in the work, I am pleased to state has already had a good effect in the direction of the organization and support of a section of Vegetable Pathology. For this much we are thankful, but hope that the Club will continue its interest in the botanical work and lend its aid to a further development of it.

A liberal appropriation should be asked for from the next Congress that the Division of Botany may be able to expand its work and to improve and enlarge the Herbarium. There are many directions in which this expansion is desirable. The Botanical Collection has reached a stage where the principal desiderata can only be obtained through special efforts. These consist largely of plants of local and limited distribution which are out of the way of the great lines of travel, and can only be obtained by sending collectors into such special fields. Then it is desirable that this Division should be able to take a part in the exploration of new fields. The great West has only been partially explored. Every year many new species are being discovered, and our knowledge of the geographical range of our vegetation is being extended. The Botanical Division should be able to do something in the work; either by employing special botanical collectors to be sent into proper localities, or by giving greater assistance to already known local botanists—probably by a combination of both plans. The botanical work is intimately associated with Forestry, Horticulture, (including Pomology), Medicine etc., and should be able to aid those branches. Special efforts should be made at Washington to form an Arboretum worthy of the name; one in which should be represented every tree and shrub indigenous to the United States which could be made to live there. This object cannot be accomplished without the use of liberal appropriations.

But not only should the Division take part in the work of collection and exploration in the field, but it should have the means of employing specialists to work up certain lines of which the general botanist can have only a limited knowledge. The Herbarium is now greatly in need of special work on Lichens, Algæ, Ferns, Cyperaceæ and other orders.

It is peculiarly fitting and proper that the Government should encourage the advancement of the Natural Sciences, and particularly by building up at the National Capital scientific collections where all the productions of the country may be properly represented and made accessible to the people for study. Such collections are a necessity of the age, and every country of the world which is advanced in intelligence makes its Capital the headquarters for information relating to its productions and resources.

I have the pleasure of stating to you that the Commissioner of Agriculture appreciates the scientific work of the Department, and I have confidence that an expression from you relative to the importance of extending the work of the Botanical Division will be useful in securing such help as is needed from Congress.

On motion, Dr. George Vasey, Prof. W. G. Farlow and Prof. W. J. Beal were appointed a committee to consider the whole matter and report at a subsequent meeting of the Club.

FRIDAY, AUGUST 12th.

The session opened with further discussion regarding the Herbaria at Washington, in which several members participated. Dr. Vasey withdrew from the committee in favor of Mr. Wm. M. Canby, and Prof. Farlow withdrew in favor of Dr. Asa Gray. The committee, now consisting of Dr. Gray, W. J. Beal and Wm. M. Canby, was accepted by the meeting and on motion of Dr. N. L. Britton was given full power to act for the Club.

Prof. E. W. Claypole read a paper "On the Effect of Pollination in the Production of Fruit," citing many cases observed by him in which the fruit was developed without the ovules having been fertilized.

Mr. A. A. Crozier read a paper on definitions of some botanical terms and asked for an expression of opinion as to the best understanding of the following:

Acetabuliform, Lanceolate, Androgynous, Dextrorse, Natant, Icosandrous and Isostemonous.

Dr. N. L. Britton remarked on three species of *Cyperus* not included in his Preliminary List of the North American species, viz: *C. longus*, L. collected by Rugel at Austin, Texas, and communicated by Mr. I. C. Martindale; another from the same locality and obtained through the same sources which nearly answers the description of *C. evaginatus*, Bœckl., (Linnæa, xxxvi, 351); the third also collected by Rugel, in Florida, is identical with a specimen obtained in the same region by Dr. Chapman and seems to be undescribed.

Mrs. Wolcott exhibited and remarked on some yellow-fruited choke-cherries (*Prunus Virginiana*) collected at Dedham, Mass., during the present summer.

MONDAY, AUGUST 15th.

On motion the Chairman appointed Messrs. David F. Day, Wm. M. Canby, and A. A. Crozier a Committee on Resolutions, and Prof. W. J. Beal, Dr. N. L. Britton and Mrs. H. L. Wolcott a Committee on Nominations. It was also resolved that the Secretary be instructed to request the Committee of Arrangements for the next meeting of the Association to provide a special room for the meetings of the Botanical Club.

Mr. W. M. Canby announced the discovery by Mr. M. E. Hyams of the fruit of *Darbya umbellulata*, Gray, and exhibited specimens collected by the dlscoverer near Charlotte, N. C. These show that the genus is distinct from *Buckleya*, with which it has been united by Bentham and Hooker, and more closely allied to *Comandra*, from which it differs in its opposite leaves, and axillary flowers (the pistillate probably single, the staminate umbellate), and in other characters. The specimens tend to confirm Dr. Gray's original opinion that it is distinct from either; nevertheless *Comandra livida* exhibits intermediate characters. He further remarked on the history of the plant, stating that it was collected with immature fruit by Dr. Boykin at Milledgeville, Ga., and reported in Silliman's Journal in 1846; these specimens were lost at sea. Staminate flowers have been collected by M. A. Curtis at Lincolnton, N. C. and by Chas. Mohr in Northern Alabama. He expressed the hope that the pistillate flowers would be collected next spring, and that then Dr. Gray would complete the description he had so well begun.

Mr. A. A. Crozier described an oven for drying botanical specimens. It consisted of a sheet-iron box, three feet high and wide enough to take in a plant-press, which was placed on a platform under which was an oil stove or gas burner.

Rev. Thomas Morong introduced the proposition of forming a Botanical Exchange Club in America, similar in its objects to those existing in London, Berlin, Lund, and other cities of Europe. After considerable discussion in which Prof. Beal, Mr. Crozier, Prof. Spalding, Dr. Britton, Dr. Rusby, Mr. Canby and Mr. Fernow participated, it was finally resolved to refer the whole matter to a committee with power to act for the club and, on motion the Chairman appointed Dr. George Vasey, Dr. Sereno Watson and Dr. N. L. Britton. On subsequent motion the Chairman Thos. Morong and Prof. Byron D. Halsted were added to the Committee, which was requested to report through the Botanical magazines.

Mr. F. Lamson Scribner remarked on the ejection of ascospores from the asci of the Black Rot fungus *Physalospora Bidwellii* (Ell.) Sacc. Grapes collected by Prof. Viala at Vineland, N. J., on June 10th were placed in a moist chamber; the ascospores were thrown from ten to fifteen mm; they were expelled in one instance in eighteen and in another in twenty-four hours; after another twenty-four hours they began to germinate. He further remarked on the spread of the Black Rot in France, where it appeared about two years ago in a single district; recent advices state that it has now spread to a considerable extent in the southern provinces.

Field Meeting in the afternoon. The Club went to Sandy Hook, N. J., accompanied by the TORREY BOTANICAL CLUB, the Entomological Club and representatives of the Natural Science Association of Staten Island and of the Brooklyn Entomological Club. During the return trip a meeting was held during which the plants observed and collected were discussed. Mr. Morong remarked on the sensitive stigma of *Martynia proboscidea* and Prof. Beal called attention to the extremely glutinous pubescence of its lower leaf surfaces—which were found covered with dead insects. Judge Day remarked on the similarity of the coast flora to that of Lake Erie. Mr. Morong spoke of the extensive manufacture of wax from the berries of *Myrica cerifera* on Cape Ann, Mass. Dr. Britton distributed specimens of *Senecio Cineraria*, DC., and stated that it was naturalized in many places on the beaches about New York. Dr. Arthur remarked on the occurrence of the Black Knot on *Prunus maritima* and stated that this shrub was perhaps a new host plant for the fungus; he also described the smut so abundant in the inflorescence of *Cyperus Grayii*—probably a species of *Cintractia*. Mr. Scribner supplemented Dr. Arthur's remarks.

TUESDAY, AUGUST 16th.

The Committee on Nominations reported as follows:

For Chairman, David F. Day, of Buffalo.

For Secretary, Volney M. Spalding, of Ann Arbor.

The report was accepted and the officers elected for next year.

The Committee on Resolutions submitted the following:

We, the members of the Botanical Club of the American Association for the Advancement of Science, gratefully appreciating the innumerable courtesies which have been extended to us by the Torrey Botanical Club, during the session of the Association now about to close, find it both a duty and a pleasure to place upon our records this faint expression of our indebtedness and gratitude.

RESOLVED: That we tender our sincere thanks to the members of the Torrey Botanical Club, whose liberality towards their brother botanists seems an inheritance from the distinguished scientist whose name they bear, for their constant and completely successful efforts to minister to our comfort and pleasure during our stay in the city of New York; and for the generosity and fraternal kindness which have opened to our inspection and study the priceless treasures of the Torrey Herbarium and Library; and for the valuable gifts of botanical specimens characteristic of this vicinity, with which some of us have been enriched; and for the repeated opportunities which they have provided for us of examining and collecting in their native haunts many of the most important and interesting plants of the seaboard and its vicinity; and for their constant and untiring endeavors to make our sojourn in the metropolis replete with pleasure and profit.

Prof. Macloskie read some notes on the marginal hairs of the watermelon seed, stating that in a transverse section the patches of white in the gelatinous layer prove to be hairs packed transversly, which when moistened extend and show a zig-zag branching. They illustrate the crowding of young organs.

A. A. Crozier presented for distribution the first part of the list of desiderata of the Herbarium Department of Agriculture.

Mrs. N. L. Britton stated that for the second time this year the *Wistaria* is blooming abundantly at New Dorp, Staten Island, and called attention to the difference in the inflorescence, the second racemes forming at the ends of the young branches and elongating with them, sometimes attaining a length of two feet. It was also stated that pods are more frequently formed from this second inflorescence, and this was accounted for by the fact that the marauding Humble-bee is the most frequent visitor in June, while in July a species of *Megachile* visited the flowers in a normal way.

Rev. Thomas Morong asked for observations on the distribution of *Typha*, stating that *T. angustifolia* seems to be confined to brackish waters, whereas *T. latifolia* is more abundant inland. On Nantucket nine-tenths of the cat-tails are *T. angustifolia*. He also asked botanists to collect and pay more attention to the characters which distinguish the two species. He also called for more careful study of *Sparganium*.

David F. Day stated that Judge Clinton had collected *Typha angustifolia* near Buffalo, and that double fertile spikes are not uncommon in *T. latifolia*.

Sereno Watson said that *Arabis petræa* must be dropped from the manuals as it has been found to be *Sisyribrium humile*, Meyer. It occurs at Willoughby Notch, Canada, and the White Mountains, and may be looked for in the Adirondacks.

Dr. Mary B. Moody exhibited specimens of *Epipactis latifolia*, and read a paper giving the circumstances of its discovery near Buffalo, stating that a station has been recently found where it grows in great abundance, which, if not wantonly destroyed, is capable of supplying all the Herbaria with specimens.

F. Lamson Scribner remarked on the abundance of *Cercospora Viticola* (*Græphium thelysporium*) near Fayetteville, N. C., on the foliage of the grape vine, producing reddish-brown spots on both sides of the leaves. He also showed packets of fungi, explaining the method of labeling, mounting and arranging in vogue at the Department of Agriculture. Classification is by the host plant, arranged in packets uniform in size and labeling, mounted with one species only on a sheet, species alphabetically arranged under genera.

On motion, the Club adjourned to meet *sine die* at Cleveland next year.

BOTANICAL PAPERS READ BEFORE THE SECTION OF BIOLOGY.

Vice President, W. G. Farlow, of Cambridge.
Secretary, J. Henry Comstock, of Ithaca.

Notes on the Flora of the Kittatinny Mountains. 5 m. By **N. L. Britton.**

Developments of the Umbellifer fruit. 25 m. By John M. Coulter read by W. J. Beal.

On the structure of the frond in *Champia parvula* Harv. 10 m. By Robert P. Bigelow.

Apical growth in Fucus. 10 m. By W. G. Farlow.

Study of the hairs in *Silphium perfoliatum* and *Dipsacus laciniatus* in relation to insects. 12 m. By W. J. Beal and C. E. St. John.

Character of the injuries produced by parasitic fungi upon their host plants. 15 m. By A. B. Seymour.

Notes on Catalpa leaf spot disease. 15 m. By Effie A. Southworth.

On the histology of the vegetative organs of *Brasenia peltata*, Pursh. 30 m. By J. Schrenk.

The Cultivated *Cinchonas* of Bolivia. 20 m. By H. H. Rusby.

Aecidium on *Juniperus Virginiana*. 10 m. By W. G. Farlow.

A comparison of the Epidermal System of different plants. 8 m. By W. J. Beal.

The honey plant (*Echinpos sphærocephala*). By Mrs. F. S. Pease.

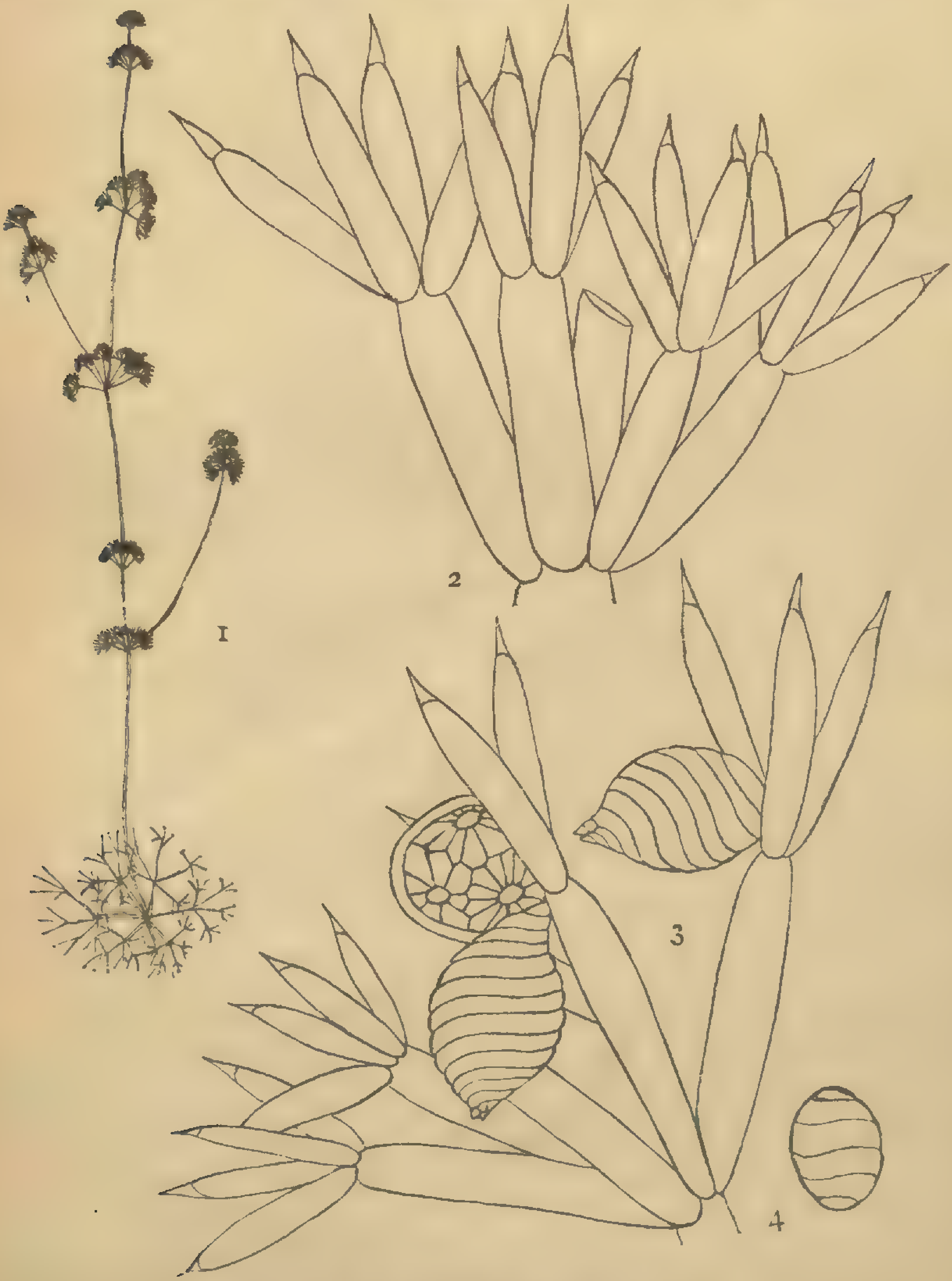
Honey plant oil. 10 m. By F. S. Pease.

Some notes on American roses. 10 m. By Sereno Watson.

The flora of the Amboy clays. 10 m. By. J. S. Newberry.

The flora of the Potomac formation in Virginia. 20 m. By William M. Fontaine.

Methods of branching in the fibro-vascular system of plants. 10 m. By A. A. Crozier.



Chara Muthnatæ, Allen, n. sp.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XIV.] New York, October 4, 1887. [No. 10.

Some Notes on Characeæ.

By T. F. Allen, M.D.

Plates LXXI–LXXV.

A NEW NITELLA FROM THE FEEJEE ISLANDS.—(PLATE LXXI.)

NITELLA MUTHNATÆ, *n. sp.*—Diarthrodactyla, homœophylla, monoica, sub-flabellata, (sub-species *N. mucronata*, A. Br., sensu latissimo) Tenuis. Caulis ad 15 cm. longus, 0.475 mm. crassus. Verticilli remoti difformes; inferiores steriles diffusi; superiores fertiles, brachyphylli, globoso-contracti, 6 foliis. Folia plerumque duplicato-divisa, segmentis primis ad 1.0-1.20 longis, divisionis primis sterilibus; segmentis secundis ad 0.575-0.800 longis, 0.135-0.175 crassis, *divisuris secundis fertilibus;* segmentis ultimis ad 0.425-0.500 longis, 0.100 crassis, bicellularibus, *apice non-attenuatis,* cellula secunda mucronem angustum et elongatum formante terminatis, (mucrone ad 0.080-0.100 longo). Sporangia in divisuris secundis, *solitaria*, coronula brevi, nucleo ovali, fusco, striis non prominulis, 5-gyrato, 0.265-0.285 longo.

This species is represented by but one specimen in the herbarium of Columbia College, New York, from Muthnata Island (one of the Feejee group), collected by the Wilkes Exploring Expedition, 1838-'42, and distributed by the Smithsonian Institution. The inferior verticils are spreading and sterile, but the fertile verticils are contracted and remote, almost moniliform in a kind of spike. The fertile portion of the plant is closely similar to *N. tenuissima.*

The leaves are never more than twice divided, which might bring the plant under the *sub-flabellatæ* section of the *mucronata* group. In this case its relations would be rather with *N. brachyteles*, A. Br., from which it would differ by its solitary sporangia, which are never aggregated, and by other marks.

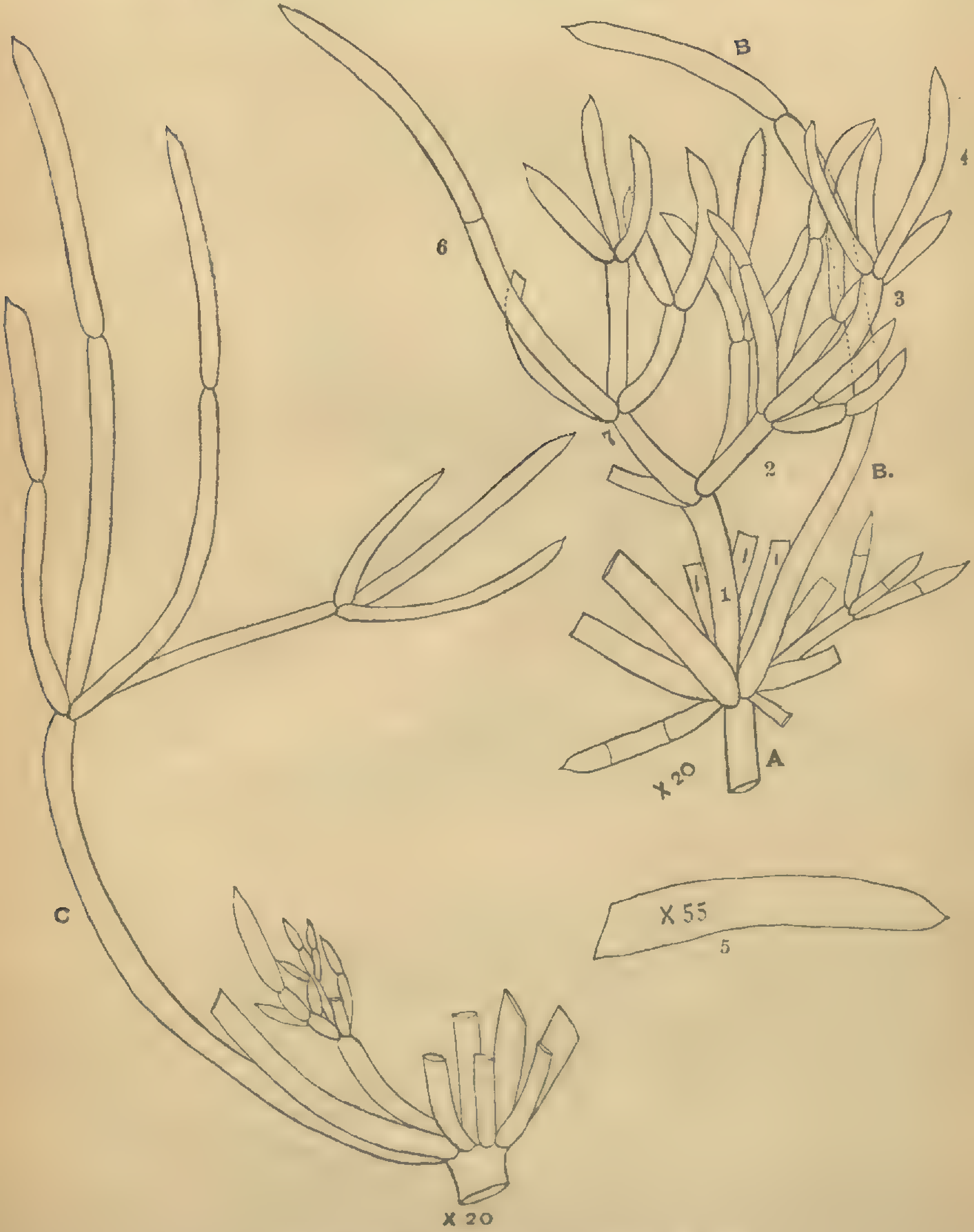
A NEW SPECIES OF TOLYPELLA.—(PLATE LXXII–LXXIII.)

TOLYPELLA MACOUNII, n. sp.—Plant 2 to 4 inches high, much branched, dense. Sterile leaves numerous; fertile heads few and very small.

Verticils of the stem consist usually of four branches bearing fertile heads and eight sterile leaves; four of these sterile leaves are usually divided into four leaflets, of which all are simple terminals two-celled; or two are again divided into two or three terminal leaflets, and when so divided the terminals are usually one-celled (Fig. C); four other sterile leaves are usually undivided, some very long, two-celled (Fig. B); others quite short and three-celled; or now and then one is short, and divided into three short terminals. The sterile leaves, which are fully developed and bear nodes and leaflets, attain a length of 15 to 20 mm.; the first segment shortest—4-5 mm.; the second, if undivided, 8-10 mm.; if divided, first part, 5-6 mm.; terminals, 6-7 mm. The diameter of the first segment is 190 μ.

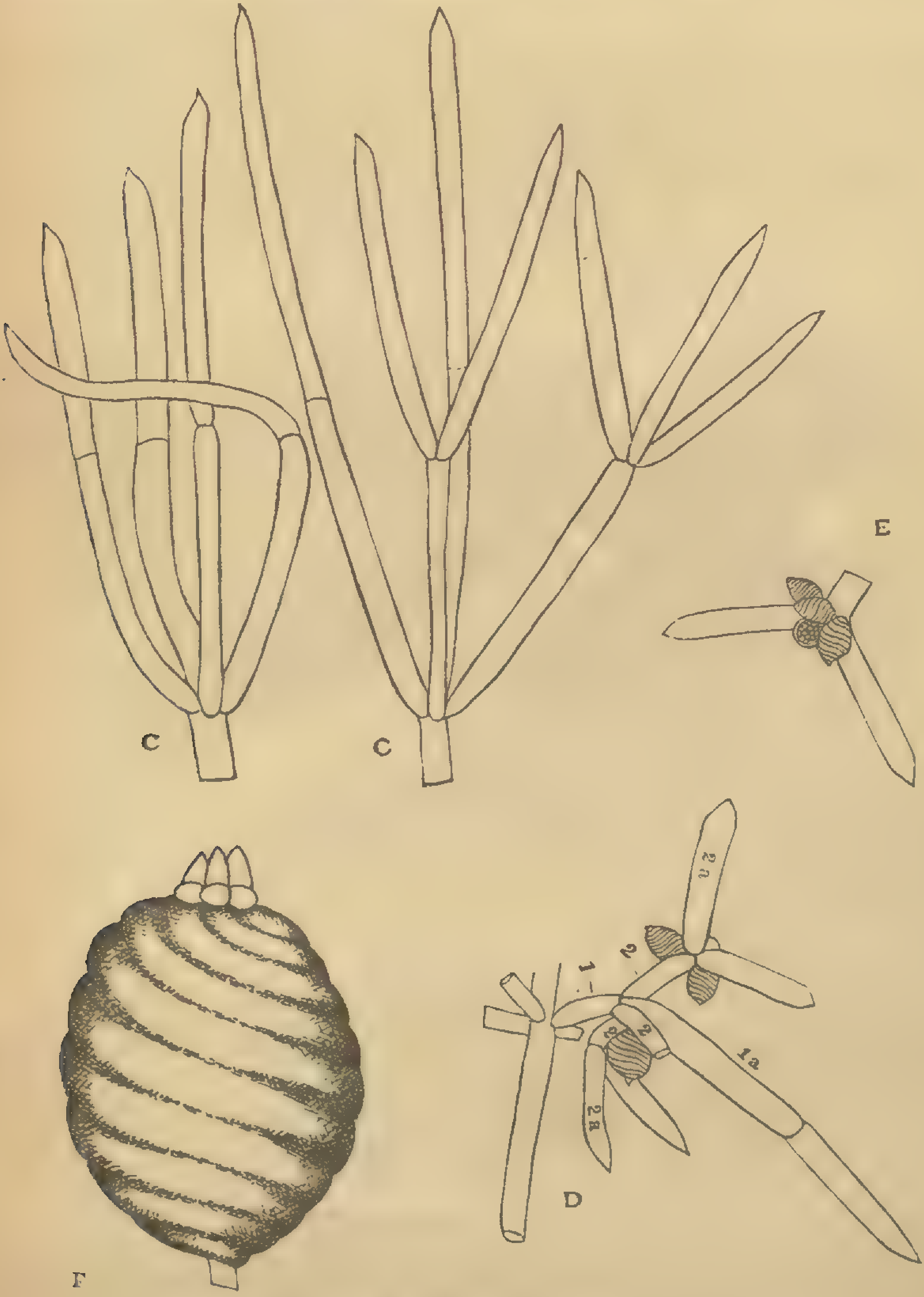
The pedicel bearing the fertile head (Fig. D) is about 1.25 mm. long and 1.65 in diam. The "fertile" heads sometimes develop no fruit, but become quite "leafy"; in this case the leaves are longer and measure as follows: first division, 145 μ. diam., divides into four leaflets, one of these (the dorsal) extends longer than the others and is simply two-celled, bearing no node; the three lateral leaflets again subdivide into three one-celled terminals. The terminals are about 120 μ. in diam., *and are not attenuate*, but end in a very short, abrupt point. See A, in plate LXII: 1, the pedicel of the "fertile" verticils, one of these is drawn out, having developed sterile; 2, second segment; 3, third segment; 4, terminal; 5, a terminal magnified 55 diam.; 6, the dorsal two-celled leaflet of a perfectly developed leaf, with three laterals from its node (7), each divided into three one-celled terminals; C., sterile leaves variously divided.

When the leaves are fertile, fruit is borne on the primary node of the leaf, and also on the nodes of the lateral rays; commonly three sporophydia at each node; *fruit is very rarely seen in the fundus of the fertile verticil.* Fig. D represents a fertile leaf with only a few fruit: 1, the first division of the leaf continued at 1*a* into the two-celled, undivided dorsal ray; 2, the

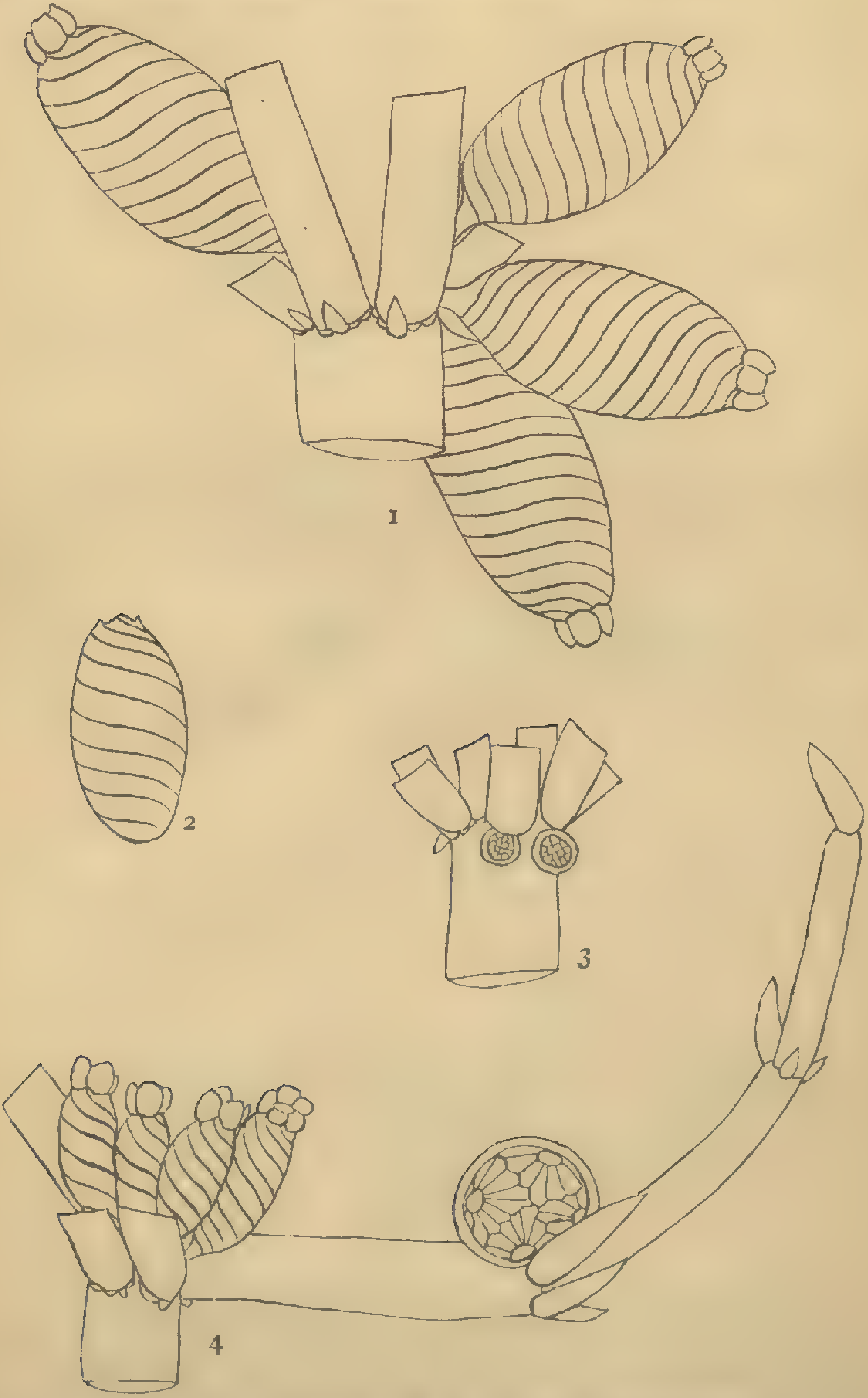

B
4
6
3
7
2
B.
1
A
X 20
C
X 55
5
X 20

Tolypella Macounii, Allen, n. sp.

Bulletin of the Torrey Botanical Club. Plate LXXIII.


C
C
E
2a
2
1
2
2
1a
2a
D
F

Tolypella Macounii, Allen, n. sp.



Chara Succincta, R. Br., from Mauritius.

second divisions or lateral rays; *2a*, the one-celled terminals of these rays, usually, in the fertile verticils, two in number, *and always one-celled.* E, a single lateral ray, with one antheridium and three sporophydia.

Sporophydia (Fig. F) clustered on the nodes of the leaves and lateral rays, and more rarely in the fundus of the verticil, not stipitate. Coronula persistent, and nucleus smooth, with 5-6 striæ, 210-215 μ. long, 200-210 broad; antheridia 130 μ. in diameter.

Collected in "August, 1882, in a pool on the shore of Niagara River, above the Falls," by Prof. Macoun. The description of this species has been delayed in the hope of obtaining more specimens (two only were gathered), but visits to the locality have been unsuccessful; but the species will doubtless be rediscovered.

This is one of the most remarkable *Tolypellæ* that has yet been described, from the fact that the terminal cells of the fruiting rays are one-celled. No other species has such simple terminals; no species has so little fruit and such imperfectly formed nests. It is nitella-like in its habit of growth, slightly incrusted, and altogether unique.

CHARA SUCCINCTA, A. BR. (or a closely allied species.)—
(PLATE LXXIV.)

A fragment of *Chara* collected in the island Mauritius and communicated by Miss F. E. Hitchcock, presents points of great interest in the following respects:

It is wholly devoid of cortex, and is perfectly free of incrustation. The stems are long and slender, perfectly diaphanous, 0.400 mm. in diameter.

Verticils distant, with very short incurved leaves.

Stipules *opposite* the leaves very short or obsolete.

Leaves with three nodes: the first segment 0.830 long, the second 0.700, the third 1.070 (average of several measurements); the terminal segment single, large, not mucroform. Bracts verticillate, generally very short posteriorly; anterior bracts as long as diam. of antheridium. Sporophydia (Sporangia) numerous in the fundus of the verticil (generally one opposite each leaf), on quite long (0.310 mm.) pedicels; whole length of sporophydium (except its pedicel), 0.835 (-900); length of coronula, 0.120. Coronula of roundish cells not elongated. Nucleus, when mature, smooth, black, with 9-10 faint striæ, and with two sharp points at the base, 0.620-.645 long, 0.310-.330 broad. When immature, the angles are strong and winged.

On one verticil two small abortive antheridia were seen on the outside, occupying the place of stipules, opposite the leaves. No sporophydia occur in this position, but sometimes the long-stalked sporophydia turn down between the leaves and appear to be situated externally.

Antheridia on the first node of the leaf, separated from the sporophydia, 400 μ. in diameter; rarely situated on the outside of the verticil.

This form differs in some respects from the description of the one from the rice-fields in an oasis of the Libyan desert. That species grew in salty water, had spreading leaves, and the aspect of a "large *Ch. aspera* or a moderate *Ch. contraria*," but the size of the fruit and the other peculiarities lead me to unite this form with that species.

Fig. 1—A mature verticil, with minute opposite stipules and pedicellate sporophydia within the verticil of leaves. Fig. 2—A mature nucleus. Fig. 3—Small abortive antheridia outside the verticil. Fig. 4—A young verticil, with immature sporophydia, with a mature antheridium on the first node of the leaf.

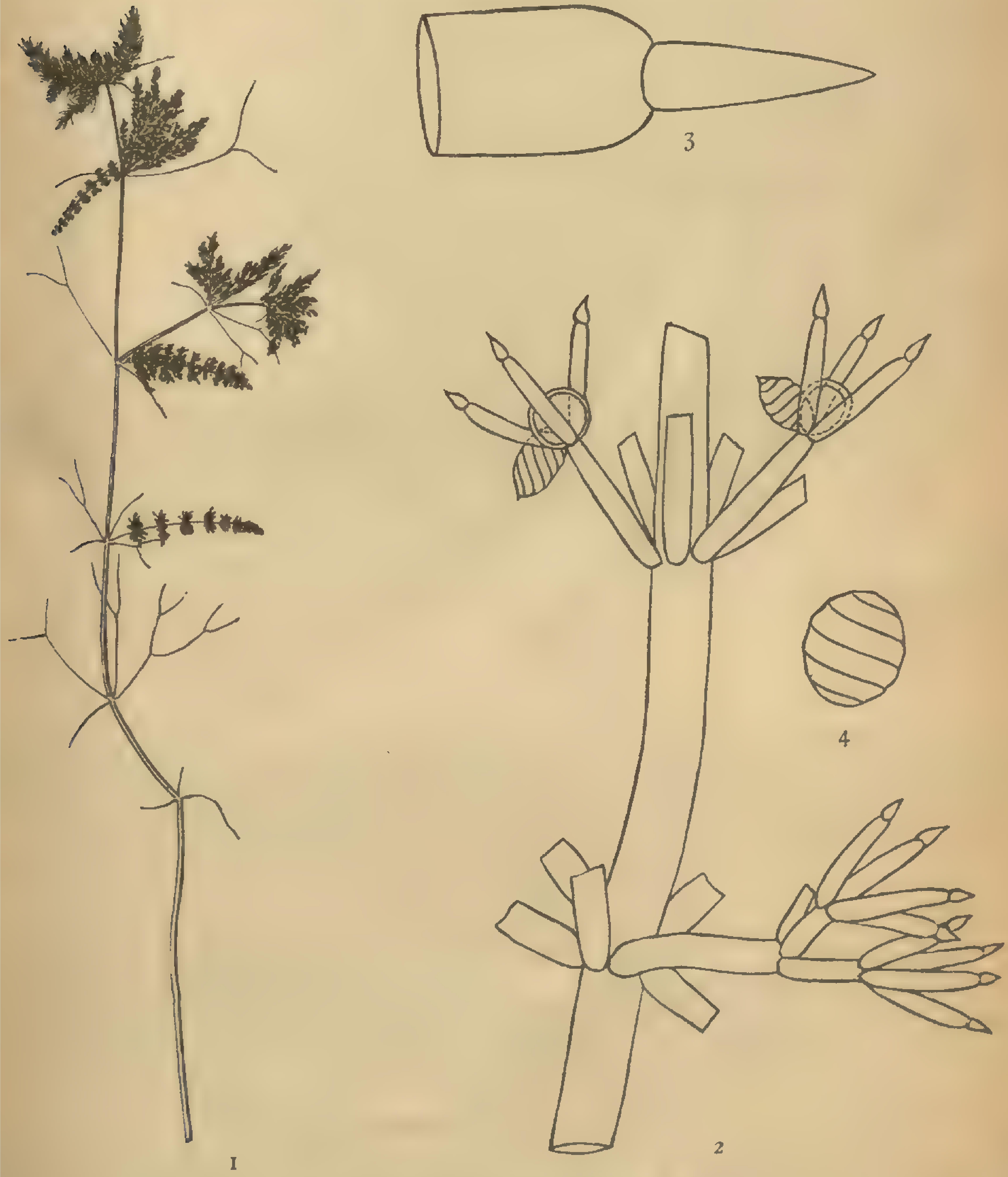
All figures magnified 40 diameters.

A NEW NITELLA FROM NANTUCKET.—(PLATE LXXV.)

NITELLA MORONGII, n. sp. Diarthrodactyla, homœophylla, monoica, macrodactyla, sub-flabellata.

Plant 5-6 inches high; lower leaves sterile, elongated, once or twice divided, mucronate; upper leaves contracted, forming with their stems fertile spikes; fertile verticils numerous, crowded in terminal and axillary spikes about half an inch long; leaves of fertile verticils short, twice divided in the lower, once divided in the upper verticils. Leaves in a verticil, six; first division about 240 μ. long, 95 in diameter; terminals, usually four, or when bearing fruit three, 460 long, 80 in diam., not accuminate;

Bulletin of the Torrey Botanical Club. Plate LXXV.



Nitella Morongii, Allen, n. sp.

mucro 140 long, 45 broad at base. Fruit borne chiefly on the last division of the leaves, and sporophydia solitary, with few spirals; nucleus brown, with *five* rather prominent angles, 250-260 long, 240-245 broad. Antheridia 170 in diameter, borne on the summit of the last division of the leaf.

The old capsule of the nucleus seems quite persistent, remaining adherent long after the coronula has fallen, and resembling brown parchment-like wings along the spiral angles of the nucleus.

Plant gathered by the Rev. Thos. Morong, on the island of Nantucket, in a very muddy pool, July 21st, 1887.

Plate LXXV., Fig 1.—Plant natural size, with the numerous, crowded, axillary and terminal, contracted, fertile spikes; these fertile spikes generally arise within a verticil of sterile leaves, most of which whorl. 2, a portion of a fertile spike, × 25 diam.; on the lower verticil a leaf is twice divided, bearing on each division four mucronate terminals; on the upper verticil, once divided, with three terminals and fruiting organs. 3, the mucronate extremity of a leaf × 50 diam. 4, a nucleus with five angles × 25 diam.

Bibliographical Notes on well known Plants.—IV.

BY EDWARD L. GREENE.

NELUMBO LUTEA, Baillon, Hist. Pl. iii., 79 (1872).
Cyamus luteus, Nutt., Gen. ii., 25 (1818).
Nelumbium luteum, Willd. Spec. Pl. ii., 1289 (1799).
Nymphæa Nelumbo, var. *β*. Linn. Spec. Pl. 511 (1753).

Books on the botany of the Atlantic States which have been written within the last fifty years, have all been perpetuating a Candollean mistake respecting the rightful name of this our grandest water-lily; for *Nelumbium*, so far from being the oldest, is, in truth, the most recent of all, having been invented by Willdenow in 1799. *Cyamus* of Salisbury (1805), later in finding a modern application, is the ancient Greek name of the genus. For twenty years or more after Salisbury took it up, it was adopted, to the suppression of *Nelumbium*, by authors as prominent as Smith, Nuttall and Barton; but the elder De Candolle restored *Nelumbium*, and has had a large following. The reasons which he gave for his action were, that *Cyamus* had been applied to a genus of animals, and that *Nelumbium* was the oldest of the names propounded for these plants since the establishment of the Linnæan nomenclature. This last assertion will not hold; and, what is somewhat puzzling is, that he even cites the refutation of his statement, in the synonymy of the genus, where we read " *Nelumbo*, Adans." Would he be understood as classing Adanson with pre-Linnæan authors? He was a contemporary of Linné, indeed, but the Familles des Plantes, containing his definitions and names of genera, did not appear until 1763, ten years subsequent to the full promulgation of the Linnæan nomenclature; and this gives to his *Nelumbo*, as a post-Linnæan name, a priority of thirty-six years over Willdenow's *Nelumbium*.

I do not know in what esteem the work of Adanson, as a systematic botanist, has been held by later generations, or even by his contemporaries. In my reading I have come upon very little in the line of discussion of his merits. I can think it possible that his marked originality, and his incisive and sometimes a little unjust criticisms of Linné, should have made him singular among the botanists of his time, who, almost with one consent, paid homage to the Swedish luminary, while he withheld it. Then, again, his curious tabulated placing of generic characters, which were, after all, short and imperfect; and also his too free adoption of Oriental and otherwise objectionable names, all may have conspired to overshadow merits which, I think, were very considerable. Perhaps so late as the year 1821 a strongly prevailing prejudice against this author may have influenced even De Candolle in his practical ignoring of *Nelumbo;* and it has been left to an eminent authority of our own time, Prof. Baillon, to make the needful restitution.

Nelumbo is Ceylonese, and, for aught we know, may be older than even the Greek *Cyamus*. Its earliest appearing in Occidental scientific literature was made in 1698, in Paul Hermann's beautiful work entitled Paradisus Batavus, which, although reprinted in 1705, is now a rare book. But this author, judging it to be a species of *Nymphæa*, only cited *Nelumbo* as the aboriginal name of the plant. Tournefort in 1700 pronounced it the type of a new genus, taking up this Ceylonese name; and so the genus should be credited to him. Linné, who now and then seemed affected by a singular blindness to generic characters in plants, named it *Nymphæa Nelumbo*, and made our fine American species a mere variety of it.

It is to be noted, finally, that among post-Linnæan authors of the last century, not only Adanson, but also the illustrious Joseph Gærtner (1788), insisted upon the validity of the genus, and upon *Nelumbo* as its rightful name.

NEMACAULIS DENUDATA, Nuttall, in Journ. Acad. Philad., ser. 2, i., 168 (1848).

Nemacaulis Nuttallii, Benth., in DC. Prodr., xiv., 23 (1856); Torr. and Gray, in Proc. Am. Acad., viii., 146 (1870); Watson, Bot. Cal., ii., 16 (1880).

Eriogonum denudatum, Curran, in Bull. Cal. Acad., i., 274 (1885).

From a rather superficial examination of the specimens which have induced the proposition made by Mrs. Curran, I am disposed to think well of it, and that so, the name which I have placed as the latest synonym may perhaps worthily supersede the others. But I also perceive that the alternative course of adding a species or two to *Nemacaulis* and retaining it as a genus, might possibly be found the better way. However, the above ordering of names best exhibits how a consensus of authors may deal with the rights and prerogatives of another, through a long series of years.

Nuttall, one of the most laborious and successful men who ever worked for thirty-four years in the field of North American botany, discovered the plants and founded the genus *Nemacaulis*, deeming the species two, and naming them respectively *N. denudata* and *N. foliosa*. When, a few years afterwards, it fell in Mr. Bentham's way to take up the genus, he seemed to find that the species was but one. Then, instead of following the ordinary practice of authors in such cases, and leaving the descriptive and quite unobjectionable *N. denudata*, Nutt., in its place, writing *N. foliosa* as a synonym, he displaced both the names of Nuttall and made himself the author of the species by writing

N. Nuttallii; and this, which a fearless critic might call a bit of scientific iniquity, has been adopted and made his own by each American author who has, since Bentham's time, handled the Eriogoneæ, as all our books and catalogues will show.

CHÆNACTIS SANTOLINOIDES, Greene, Bull. Torr. Bot. Club, ix., 17 (1882); Gray, Syn. Fl. i., part 2, p. 341 (1884).

This plant has little bibliography, but more than is given it in the Synoptical Flora, where the author of the work says in effect, that it was, up to that date, unpublished. It had been described two and a half years before, in the February number of this journal for that year.

Note on Mollugo verticillata, L.

"Stamens, five; sometimes three or ten; filaments setaceous, shorter than and opposite to the sepals." The above from Wood; and further, in the detail, he notes: "Stamens mostly three."

One can understand that there ought to be five or ten, the rest being suppressed. I have made it a point to look at some in passing every few days the past season, and there have always been but three, except in one case four. I find, however, that "stamens opposite the sepals" applies to only two, the other one of the three being uniformly alternate with the sepals. Assuming that the normal stamens should be in a whorl of five, this alternate stamen should belong to a second whorl of five. In cases where there is a double whorl of stamens, as in six-stamened monocotyledons, there is usually some difference between the inner and outer whorl—if it be only a little difference in the time of maturity of the anthers. In these three stamens I see no difference, which is remarkable if they really belong to different whorls.

It is interesting to note how well the arrangements are adapted to self-fertilization. The filaments are tightly appressed to the ovarium, and curve over at the apex, pressing the anther down on the stigmas. After the expansion of the flower the anthers remain in this position. The pollen is ejected from the anther cells simultaneously with the expansion of the sepals, covering the stigmas.

As is the case with all flowers that have the advantage of special adaptations for self-fertilization, every flower matures seeds.

THOMAS MEEHAN.

Note on some Introduced Plants in Eastern Massachusetts.

I have been quite interested in the plants I have found about Parker River Mill, a small blanket manufactory started here three or four years since. In the last two years I have visited the grounds occasionally, and of rare plants for our vicinity I have found the following: *Helenium tenuifolium*, *Echinospermum Lappula*, *Monarda punctata*, *Coreopsis senifolia*, *C. palmata*, *Erodium cicutarium*, *Medicago denticulata*, *M. maculata*, *Trifolium Macræi*, *T. tomentosum*, *Solanum rostratum*, *Physalis Pennsylvanica*, *Veronica Buxbaumii*, *Helianthus lætiflorus*, and *Dipsacus Fullonum*. Also *Tragopogon pratensis*, from another mill near by.

Some of these plants have appeared but once, and others now seem to be permanent residents in the grounds, although they live under disadvantages, as the debris of all kinds is spread upon the small enclosure.

Sherardia arvensis appears to be well established at Newburyport, Mass., it having seeded well and increased since it was noticed four years ago.

C. N. S. HORNER, Georgetown, Mass.

Index to Recent American Botanical Literature.

Additions to our State (*California*) *Flora.*—E. L. Greene. (West Am. Sci., iii., pp. 155-157.)

This descriptive list comprises six species. *Malva borealis*, of the Botany of California, proves to be *M. parviflora*, L., while *M. Nicæensis*, Allioni, has not heretofore been credited or distinguished. In the city of San Francisco itself the author finds *Paronychia Chilensis*, DC. From the collection of Mr. and Mrs. Lemmon in the mountains of San Luis Obispo County the following new species and varieties are described: *Thelypodium Lemmoni*, *Eschscholtzia Lemmoni*, and *Chænactis tenuifolia*, var. *Orcuttiana*.

Algæ, Marine, of the Maritime Provinces, with a List of Species.—G. U. Hay and A. H. MacKay. (Bull. Nat. Hist. Soc., New Brunswick, vi., pp. 62-68.)

This comprises eighty-four species, collected mainly by the authors and Prof. Fowler. Specimens of *Laminaria longicruris*, De la Pyl., were collected, measuring twenty-eight feet in length, and it is stated that Prof. Lawson, of Dalhousie College, used its hollow stipes in place of rubber tubing, when this could not be obtained at once, and found them to answer well for the conduction of gas. Dulse, *Rhodomenia palmata* (L.), Grev., is exported from St. John and other places on the Bay of Fundy, to the amount of 100 tons a year. *Alaria esculenta*, Grev., another edible species, occurs at Halifax and Grand Manan.

Aphyllon as a root Parasite.—Thos. Meehan. (Proc. Acad. Nat. Sci. Phila., 1887. Advance sheets.)

Mr. Meehan reports the growth of *Aphyllon fasciculatum*, Torr. and Gr., on the roots of *Pelargonium zonale* in the hot-houses of Mr. Morris, of Des Moines, Ia. The whole period of life of the parasite did not exceed three months.

Cactuses of Southern California.—C. R. Orcutt. (West Am. Sci., iii., pp. 168-171, illustrated.)

Californian Manzanitas.—C. C. Parry. (Bull. Cal. Acad. Sci., ii., pp. 483-496; reprinted.)

This paper is "a partial revision of the Uva-ursi Section of the genus *Arctostaphylos*, as represented on the North American Pacific Coast." Dr. Parry distinguishes as new species, *A. Manzanita* (the *A. pungens* of various authors, but not of HBK, which, he says, is extra limital); *A. viscida*, (separated from *A. glauca*, Lindl.); *A. Stanfordiana*, described as of remarkable beauty; *A. insularis*, Greene, from the island of Santa Cruz, formerly listed by Prof. Greene as *A. pungens*, and *A. Pringlei*, from Arizona, named for the collector and distributed among his collections of 1885 as *A. tomentosa*.

Chamæcyparis sphæroidea, Spach. *White Cedar and its fungus, Agaricus campanella*, Batsch.—P. H. Dudley. (Journ. N. Y. Mic. Soc., iii., p. 30; illustrated.)

Cheilanthes Myriophylla, Desv.,—A new locality for.—Lorenzo G. Yates. (Journ. Bot., xxv., p. 248; West Am. Scientist, iii., p. 158.)

The island of Santa Cruz affords a new station for this Mexican and South American fern.

Clethra alnifolia, L.—(Gard. Month., xxix., p. 276; illustrated.)

Cystopteris fragilis, Bernh.—Lorenzo G. Yates. (West Am. Sci., iii., p. 157.)

The author reports this fern as new to Santa Barbara County, where it has recently been collected in the high mountains of the extreme northwestern portion.

Fungi—New Kansas.—J. B. Ellis and W. A. Kellerman. (Journ. Mycol., iii., pp. 102-105.)

Fifteen new species are described.

Lilium pardalinum.—(Vick's Ill. Month. Mag., x., p. 260; colored plate.)

Magnolia Frazeri—On the stipules of.—Thos. Meehan. (Proc. Acad. Nat. Sci. Phila., 1887. Advance sheets.)

The flowers were exhibited as illustrating the point made in a paper presented to the Academy in 1870, that the petals of *Magnolia* and *Liriodendron* are not modified leaves, but rather modified stipules.

Phanerogams of New Brunswick—Additions to the List of.—(Bull. Nat. Hist. Soc. New Brunswick, vi., pp. 80-83.)

This list contains seventeen species and varieties not enumerated by Prof. Fowler, with additional stations for a large number already listed.

Poa—The new Californian.—Dr. George Vasey. (West Am. Sci., iii., p. 165.)

Poa Orcuttiana, n. sp., is described from specimens collected near San Diego by C. R. Orcutt in 1884.

Polyporus sanguineus.—P. H. Dudley. (Journ. N. Y. Mic. Soc., iii., p. 29.)

Trees and Shrubs of New York.—Arthur Harrison. (Swiss Cross, ii., p. 63.)

Sixty-three species are enumerated from the vicinity of Lebanon Springs, N. Y.

Botanical Notes.

Dermatiscum.—In a note just received from Dr. Nylander, he informs me that the Lichen referred to in the July BULLETIN was called by him *Dermatiscum porcellaneum.* But I think I am not responsible for the misspelling, though the error is of less consequence, as the plant must be known as *D. Catawbense,* (Willey) Nyl., that name having been first published.

Nylander's Synopsis, VOL. II. I have recently received a copy of Fascicle 1, Vol. II. of this work. It contains 68 pages, breaks off abruptly and is without date, but appears to have been issued about or before 1883. It covers *Pyxine, Umbilicaria, Psoroma, Gymnoderma, Pannaria, Coccocarpia,* (these Genera, so far as American, being included by Tuckerman in *Pannaria*), *Heppia, Erioderma, Cora,* (this, however, in a note being referred to the Verrucariæ near *Normandina*) *Dichonema, Amphiloma* (*Pannaria* of Tuck.), *Parmeliopsis,* (*Parmelia* and *Cetraria* § Tuck., Syn.), *Squamaria* (*Lecanora* § Tuck). Under *Umbilicaria* is a species, *U. dictyiza,* Nyl., described as similar to *U. pustulata,* but the thallus obscurely cinereous and reticulate-rugose between the papulæ, the fruit small and often agglomerate. It is said to occur on mountain rocks, from North Carolina to Newfoundland. I have not seen it and it is not noticed by Tuckerman.

It is an error to say (p. 34) that *Pannaria leucosticta* is an earth Lichen. It occurs only on rock and bark, and is hardly a sub-species of *P. lepidiota.*

Under *Heppia* is *H. planescens,* Nyl., "the thallus glaucous-cinerascent, squamose, smooth, opaque, sub-plane, large," fruit unknown. On earth from Texas, sent by Tuckerman, who does not notice the plant in his synopsis; probably the absence of fruit rendered it difficult for him to determine its true place.

Erioderma Wrightii, Tuck., is cited from Mexico.

Parmeliopsis Wrightii, on p. 56, cited from Tuck. Obs. is *Physcidia Wrightii,* Tuck. Obs., 1862, p. 400. *P. squamulosa,* Tuck., in the following page of the same, is noted in my copy in the author's writing, as "a remarkable variety but not a species," and in a letter to myself he referred the genus to the vicinity of *Pannaria.* H. WILLEY.

In the report of the Proceedings of the Club, it is stated in the September BULLETIN that Dr. Newberry had not met with *Liquidambar* in Ohio. I have seen several specimens within a few miles of Oxford, Ohio, and in the vicinity of Cincinnati. It is abundant in Kentucky and in southern Indiana. It has been planted extensively in some of the suburbs of Cincinnati and grows well.

It is also stated in the same number, by C. F. Millspaugh, that the usual habitat of *Oxalis violacea* is on rocks. Where I have seen it growing, in southern Ohio, it has almost invariably been in leafy mould in shaded, damp woods.

JOSEPH F. JAMES.

Some Stations for Plants from Kansas.—The following plants were collected during a recent trip: *Argemone platyceras*, Link and Otto., Larned to Comanche; *Cleomella angustifolia*, Torrey, Larned, Kingman and Wichita; *Polanisia uniglandulosa*, DC., Wichita; *Sapindus marginatus*, Willd., a tree twenty-five feet high and nine inches in diameter, on the Medicine River, thirty miles west of Medicine Lodge; *Stenosiphon virgatum*, Spach., Comanche; *Mentzelia albicaulis*, Douglas, Comanche; *Vernonia Baldwinii*, Torrey, not as common as in Eastern Kansas (in the Catalogue of Kansas Plants this species appears as *V. Noveboracensis*, var. *latifolia*, Gray); *Eustoma Russellianum*, Griseb., Great Bend; *Stillingia sylvatica*, L., Wichita; *Juniperus Virginiana*, L., Comanche County, thirty miles west of Medicine Lodge.

J. H. OYSTER, M. D.

The Ancient Cities of the New World—Desiré Charnay. (Gard. Chron., i., p. 809, June 18th, 1887) In reviewing this work, particular attention is given to the statement that the concentric circles of the mahogany and other trees correspond rather to months than years, thus invalidating the calculations of the age of many of the Central American ruins.

Sorghum vulgare, L., *as a Drug.*—A new application is reported for that plant of varied utility, *Sorghum vulgare*, L. Dr. A. A. Coleman, of Crawford, Miss., reports that the seeds, of which he sends a sample, and which are those called "chickseeds," are astringent and hemostatic. An infusion is used by the country people as a remedy for dysentery, and to arrest bleeding externally. There is no published analysis of the constituents of these seeds, but the effects are evidently due to a considerable quantity of tannin which they contain. H. H. R.

The death of Dr. Georg Winter is announced as having taken place August the 17th, 1887, at Connewitz, near Leipzig. This will be a serious blow to Cryptogamic Botany, as he was editor of Hedwigia and had charge of the Section dealing with the Fungi in Rabenhorst's Kryptogamen Flora von Deutschland.

The Herbarium of Professor Henry H. Babcock has been presented to the Northwestern University at Evanston, Ill., by Mrs. Babcock. It is said to contain more than 10,000 species, the greater number mounted and accessible.

Brown University has recently received the gift of a valuable herbarium from Mr. E. R. Brownell, of Hartford, Conn. It was the property of C. M. Brownell, M.D., deceased, who was a devoted botanist. The collection contains about 2,500 species from Germany, Cuba, Russia, and the United States, especially Florida. It includes many duplicates, and the Cuban specimens are wholly unnamed. (W. W. Bailey. Annual Report Brown Univ., 1887.)

On the History of Botany in Japan—By Tokutaro Ito, F.L.S. (Journ. Bot., xxv., pp. 225-229; with portrait.) These remarks are intended as supplementary to the paper on the "Progress of Botany in Japan," by F. V. Dickins, published in the Journal of Botany for May. The portrait is that of Ito Keisuke, the grandfather of Tokutaro Ito, and a brief account of his works in botany is also given.

Eleocharis, R. Br., Species in Europa vigentes recensuit C. B. Clarke. Mr. Clarke recognizes eight species of *Heleocharis* as European. *H. palustris,* R. Br., *H. ovata,* R. Br., (*H. obtusa,* Schultes), *H. atropurpurea,* Kunth, of general tropical distribution, and *H. acicularis,* R. Br., are also found in North America. There is also a *H. palustris,* var. *Watsoni,* from Scotland, Newfounland, Labrador and Subarctic America. (Journ. Bot., xxv., pp. 267–271). N. L. B.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XIV.] New York, November 4, 1887. [No. 11.

Bibliographical Notes on well known Plants.—V.

By Edward L. Greene.

Gleditschia aquatica, Marshall, Arb. Am. 54 (1785).
Gleditschia Carolinensis, La Marck, Encycl. ii. 465 (1786).
Gleditschia monosperma, Walter, Fl. Carol. 254 (1788).

It has been only within a few years that American botanists, following the slow lead of the British, have begun to acknowledge, what numerous and very eminent continental authorities always insisted upon—namely, the necessity of adopting the oldest specific names of plants; relegating to synonymy every later one, no matter how much more appropriate. They who go no further at present, admit this, that the earliest name given to a species under its proper genus is the one which ought to be used, in preference to any more recent one, which may be more fit or accurate. The wild license indulged in by botanists of the early part of the current century, more especially the British, in the coinage of new names for plants that had old names enough, threatened to make the newly adopted binomial nomenclature a curse to science rather than a blessing—hence the necessity, which the wisest early foresaw, of placing a check upon this rage for the improvement of specific names; for the faultiness of the old was usually the excuse for proposing a new one. The perfectly natural principle by which to bridle the vanity of the makers of new names is that of priority; and this principle also carries with it a strong point of justice to the authors, who are always admitted to have something like a legal right invested in the name of a new species.

That we in America are slow to join in this wholesome and even necessary reform movement, now active everywhere else, is instanced in the case of this southern species of honey locust; for in all the books, even down to Watson's Index, published in 1878, it is put forward under a name which is third in the order of priority.

It might have been urged, at a time when such a plea would have been listened to, that Marshall's name *aquatica* was a *nomen falsum*, the tree not being exactly aquatic. But the universally accepted *Quercus aquatica* is inappropriate in the same degree; and there are many other instances in which the same adjective is permitted to stand as the specific name of a plant which is not strictly aquatic, but an inhabitant of wet grounds or swampy places. A more probable reason of its failure to obtain currency in the case of this honey locust is this, that Marshall's Arbustum appeared as a small volume, something better it is true, than a nurseryman's descriptive catalogue, and yet not defining things in precisely the Linnæan phraseology; and the whole being published in the English language at a time when nothing botanical would be deemed worthy the notice of botanical authorities unless done in Latin. The book could hardly have been known to many Old World botanists, when only three years after its publication there came out in London, Walter's Flora Caroliniana, in which the tree was described under the very appropriate name *G. monosperma*. However, Marshall's right of authorship in this species is beyond question, and his name, *G. aquatica*, must surely supersede the one which has so almost invariably and for a whole century, usurped its place.

AMARANTUS LEUCOCARPUS, S. Watson, Proc. Am. Acad. x., 347, (1875).

Amarantus leucospermus, S. Watson, op. cit. xxii. 446 (1887).

In the place last cited the author of these names says: "Opportunity is here taken to correct the name which was at first carelessly given to the species." But what is thus called a correction plainly amounts to the creation of a new name by which to displace an old one. No one will seriously contend that *leucospermus* is a mere corrected writing of *leucocarpus*. It is a new name altogether; and this is even admitted by the author, who, having propounded it, immediately writes the earlier one after it as a synonym, an action which a merely grammatical correction does not call for. In constructing names, it is indeed well to keep in mind the difference between a *carpos* and a *sperma*, a fruit and seed, but if one fail in this and use the wrong term, the matter seems to be of small importance; for in truth the distinction between a fruit and a seed is not in all cases so easily drawn as the authors make it. In the process of name-making the two have often been confounded, and perhaps not always out of carelessness; sometimes, doubtless, purposely, and because it is a question of no importance. Illustrations of this are found in our most scholarly books of systematic botany. It was hardly in carelessness that Dr. Gray named a *Bidens heterosperma*, or, still more recently, a *Bigelovia leiosperma*, although what each of these names describes is a character of the *carpos*, rather than *sperma*. No authors complain of them, or any other such names or think of forcing them to give place to new ones more exactly framed, and all these are precisely analogous to the case made the subject of this note. The worst criticism which the most refined sense of accuracy could pass on such a name would appear to be that of placing it under the old dictum, *fieri non debet, factum valet.*

Amarantus leucocarpus is an entirely valid name, and as such rejoices in a dozen years of priority over the more nicely compounded new one. It has been the common property of the botanical world during these years, and the botanical public may not feel disposed to give it up; rather, may think it ought not to be given up. There have been in times past a few advocates of the principle that authorship of a botanical name is naturally invested with certain peculiar privileges of altering, recalling and replacing—a principle of which the disastrous results upon the literature of science, by inviting to an excessive multiplication of synonyms, are easily foreseen; and there is probably no author now living who would contend for any special rights of this kind. A name, if it be in one view so much the author's property that others must respect and use it, is also public property from the date of its publication, and he who attempts to recall a name should bear in mind that he has a public consent and approval to gain or lose; that whether he lose or gain his point with the public, he has made a synonym, and that, under the continually strengthening and prevailing conviction of the need of paying all respect to priority, it is most likely, indeed altogether inevitable, that the newer and more accurate name will be the one to take a useless place among the synonyms.

Annotations.

By Asa Gray.

NELUMBO LUTEA. Pers. Syn., i. 92 (1807). This is probably the first appearance of the name in this form. Persoon himself cites Willd. (sub *Nelumbio*); but the difference in orthography, although affecting only the termination and the gender, is rather too much for that mode of citation. It would have been remarkable if the name had not appeared in this form until the year 1872, as Professor Greene supposed. Tournefort is, of course, the authority for the genus. That Jussieu should have changed the termination of the word, and that De Candolle should have followed him in what is politely called a "Candollean mistake," was in those days most natural and excusable, though surely unnecessary.* That Bentham and Hooker, in the new Genera Plantarum, should have gone back only to Jussieu, was in accordance with the plan of that work, which was to start with Linnæus.† As I have followed the more ordinary course and, with Linnæus, recognized Tournefort as the scientific founder of genera, I have adhered to the original form *Nelumbo* in the manuscript of the Synoptical Flora.

NEMACAULIS, *as to specific nomenclature.* Professor Edward L. Greene, in the October number, is certainly "a fearless critic," and in that capacity he attributes to (of all men) the late Mr. Bentham "a bit of scientific iniquity which has been adopted and made his own by each American author who has, since Bentham's time, handled the *Eriogoneæ*,"—that is the venerated Dr. Torrey, myself and Dr. Watson. As those of us who still survive are not likely, after this, to take notice of such statements, it may be well to consider for a moment what this iniquitous proceeding is. When Nuttall established the genus *Nema-*

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* If Linnæus had not been "affected by a singular blindness to generic characters in plants" (!) the form *Nelumbium* might have come in earlier and with his sanction.

† The reasons for this, although to me unconvincing, have no little force. But their plan should unquestionably be adopted if the alternative course is to attribute scientific genera to ante-Tournefortian and herbalistic botanists after the unhappy example recently set by so good a man as Baron Müller. But I continue to think that there is a logical and very practicable *juste milieu* which has, indeed, generally been adopted.

caulis, he indicated two species, *N. denudata* and *N. foliosa.* Bentham regarded the two species as one, in which he was probably right, the more so as Nuttall says they grow together and perhaps are not distinct; and to the combined species he gave the name of *N. Nuttallii*, obviously because neither of Nuttall's names was properly applicable to the species as he regarded it. This mode of proceeding has not been rare in similar cases, and in the present instance seems to be quite justified, if not actually demanded, by the rule that false names are inadmissible.

Note on Sarracenia variolaris.*

Last March I had in my room, in Gainesville, Florida, a vase full of *Sarracenia variolaris* (Yellow pitcher plant), and my attention was attracted towards one blossom which failed to open all of its petals. Examining it, I found that two of these, opposite each other, clung by their tips to the center of the umbrella-shaped style and were fastened securely there. Using a little force, I tore the tips of the petals off, instead of pulling them assunder as I had expected to do. I then opened the style with a pin and found that the tips of the petals had penetrated the style and had reached nearly or quite to its base.

After that I examined all the blossoms of *S. variolaris* that I could gather, and noticed a considerable number of variations. I saw the first case repeated in one instance, but this time there was only *one* petal connected with the style.

The normal number of sepals and petals is five with the margins entire. I found irregularities both in the number and in the shape of these. Often there were notches in the petals, and these were sometimes found in the sepals too. The division was even carried so far that occasionally six petals would be found. There were also irregular notches in the umbrella-shaped top of the style. In several cases the yellow petals were marked with delicate reddish lines at the base. MARY F. PEIRCE.

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*COMMUNICATED BY DR. GRAY.—On examination of the style in some of the specimens supplied by Miss Peirce, we find that it is more or less hollow, the tube widening at the orifice. Perhaps there is a viscid secretion, by which the tips of the petals were stuck fast. This should be looked to next spring, on the living plants. We cannot make out what is meant by the tips of the petals having "penetrated the style." ASA GRAY.

Plant Notes from Termiscouata County, Canada.

BY J. I. NORTHROP.

The parish of Notre Dame du Lac lies on the western shore of Lake Termiscouata, Termiscouata Co., Canada, about forty-eight miles from Rivière du Loup and thirty-one miles from Edmundston, N. B.

The surrounding country is for the most part rolling hills covered with the usual second growth of spruce, fir, larch and birch. There are also groves of sugar maple and yellow birch, and on the lowland near the lake the balsam poplar, *Populus balsamifera*, grows luxuriantly. *Populus tremuloides*, *Acer rubrum*, *A. spicatum*, *Prunus Pennsylvanicum* and *Rhus typhina* are common trees of the region.

The lake is about thirty miles long, and varies from three-quarters of a mile to two miles in width. The shore is in most places of slate, forming rocky points running into the lake, sometimes so abruptly as to make passing exceedingly difficult. In the crevices of the slate grow *Lobelia Kalmii*, *Campanula rotundifolia* and *Parnassia Caroliniana*. Near the bank we find *Potentilla fruticosa*, *Spiræa salicifolia* and *Myrica gale*.

Farther up *Alnus viridis*, *Cornus stolonifera* and *Viburnum Opulus* form thickets guarded by the ever present Joe Pieweed, *Eupatorium purpureum*. Here and there along the bank the berries of *Pyrus sambucifolia* add their bright color to the scene.

Along the roadside, where not shaded by trees, *Artemisia vulgaris* grows in undisturbed luxuriance, in company with the wild raspberry, *Rubus strigosus*, and *Sambucus racemosa*.

In the fields one misses the ubiquitous *Chrysanthemum Leucanthemum*, but its place is well filled by *Anaphalis margaritacea* and the Canada thistle. In many places the banks of the roadside are covered with the bunch berry, *Cornus Canadensis*, which the French Canadians aptly called " La rouge." Driving back from the lake, five or six ranges of hills are crossed in as many miles. In the valleys are lakes bordered with cedar swamps of *Thuja occidentalis*. The lakes are shallow and have a muddy bottom. *Cassandra calyculata*, *Kalmia angustifolia*, *Ledum latifolium*, are common on the borders.

The road from Notre Dame du Lac to Rivière du Loup runs partly through scattered farms and partly through woodland. The land where cleared and neglected is covered with a dense growth of *Pteris aquilina* and *Epilobium spicatum.*

From Rivière du Loup I drove to Cacouna, a distance of four miles down the St. Lawrence. The beach at Cacouna is rocky in some places, and at others sandy. On the sand *Cakile Americana*, *Lathyrus maritimus*, *Mertensia maritima* and *Arenaria peploides*, were collected. On the rocky points *Plantago maritima* was found abundant.

The plants of the following list were mostly collected during the month of August, at Notre Dame du Lac. A few are from Grand Falls, N. B., where a stay of a few days was made.

Dr. N. L. Britton has kindly annotated the list, and many thanks are due him for his assistance and for suggestions in regard to nomenclature.

CATALOGUE.

RANUNCULACEÆ.

Thalictrum polygamum, Muhl. Notre Dame du Lac.
Anemone multifida, Poir. Grand Falls.
Anemone dichotoma, L. Notre Dame du Lac.
Anemone Virginiana, L. Same locality.
Ranunculus aquatilis, L., var. *trichophyllus*, Chaix. Same locality.
Ranunculus acris, L. Same locality.
Ranunculus Pennsylvanicus, L. Same locality.
Actæa spicata, L. var. *rubra*, Michx. Same locality.

SARRACENIACEÆ.

Sarracenia purpurea, L. Notre Dame du Lac.

CRUCIFERÆ.

Raphanus sativus, L. Cacouna.
Cakile Americana, Nutt. Same locality.

VIOLARIÆ.

Viola blanda, Willd. Notre Dame du Lac.

CARYOPHYLLEÆ.

Silene inflata, Smith. Notre Dame du Lac.
Cerastium viscosum, L. Same locality.
Stellaria media, (L.) Smith. Same locality.

Arenaria peploides, L. Cacouna.

Spergula arvensis, L. Notre Dame du Lac.

HYPERICINEÆ.

Hypericum mutilum, K. Notre Dame du Lac.

Hypericum Virginicum, L. (*Elodes Virginica*, Nutt). Same locality.

MALVACEÆ.

Malva moschata, L. Notre Dame du Lac.

GERANIACEÆ.

Oxalis Acetosella, L. Grand Falls.

Impatiens biflora, Walter, 1788 (*I. fulva*, Nutt., 1818). Notre Dame du Lac.

ILICINEÆ.

Nemopanthes Canadensis (Michx.) DC. Notre Dame du Lac.

SAPINDACEÆ.

Acer rubrum, L. Notre Dame du Lac.

Acer saccharinum, Wang. Same locality.

Acer spicatum, Lam. Same locality.

ANACARDIACEÆ.

Rhus typhina, L. Notre Dame du Lac.

LEGUMINOSÆ.

Trifolium agrarium, L. Notre Dame du Lac.

Trifolium pratense, L. Same locality. Also a white-flowered form.

Trifolium repens, L. Same locality.

Astragalus alpinus, L. Grand Falls.

Vicia Cracca, L. Notre Dame du Lac.

Lathyrus maritimus, (L.) Bigelow. Cacouna.

ROSACEÆ.

Prunus Pennsylvanica, L. Notre Dame du Lac.

Spiræa salicifolia, L. Same locality.

Rubus strigosus, Michx. Grand Falls.

Rubus triflorus, Richards. Notre Dame du Lac.

Geum strictum, Ait. Same locality.

Fragaria vesca, L. Grand Falls.

Fragaria Virginiana, Duschene. Notre Dame du Lac.

Potentilla Anserina, L. Termiscouata Lake.

Potentilla fruticosa, L. Notre Dame du Lac.

Potentilla Norvegica, L. Same locality.
Potentilla palustris, (L.) Scop. Same locality.
Agrimonia Eupatoria, L. Same locality.
Poterium Canadense, L. Cacouna.
Rosa blanda, Ait. Notre Dame du Lac.
Pyrus sambucifolia, Cham. and Sch. Same locality.

SAXIFRAGEÆ.

Mitella nuda, L. Grand Falls.
Parnassia Caroliniana, Michx. Notre Dame du Lac.
Ribes lacustre, Poir. Grand Falls.

DROSERACEÆ.

Drosera rotundifolia, L. Notre Dame du Lac.

HALORAGEÆ.

Hippuris vulgaris, L. Dubé's Lake, Termiscouata.

ONAGRARIEÆ.

Epilobium spicatum, Lam. Notre Dame du Lac.
Œnothera biennis, L. Cacouna.
Circæa alpina, L. Notre Dame du Lac.

UMBELLIFERÆ.

Sanicula Marylandica, L. Notre Dame du Lac.
Conioselinum bipinnatum, (Walter) Britton.* Same locality.

ARALIACEÆ.

Aralia hispida, Vent. Notre Dame du Lac.
Aralia nudicaulis, Grand Falls.
Aralia racemosa, L. Same locality.

CORNACEÆ.

Cornus Canadensis, L. Grand Falls.
Cornus stolonifera, Michx. Same locality.

CAPRIFOLIACEÆ

Sambucus racemosa, L. Notre Dame du Lac.
Viburnum lantanoides, Michx.† Same locality.
Viburnum Opulus, L Same locality.

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* CONIOSELINUM BIPINNATUM (Walter, Flor. Car., p. 115, under *Apium*, 1788; *Selinum Canadense*, Michx., 1803). I am following Coulter and Rose in keeping up the genus *Conioselinum*.—N. L. B.

† If the *V. alnifolia* of Marshall is this plant, the name has priority; it is referred to *V. lantanoides* by Dr. Gray, in Syn. Flor., while DeCandolle, Prodr., iv., p. 328, refers it to *V. molle*, Michx.—N. L. B.

Linnæa borealis, L. Same locality.

Diervilla trifida, Mœnch. Same locality; also at Grand Falls, the latter a form with leaf-margins abundantly ciliate.

RUBIACEÆ.

Galium trifidum, L., var. *pusillum*, Gray. Notre Dame du Lac.

Galium triflorum, Michx. Grand Falls.

COMPOSITÆ.

Eupatorium ageratoides, L. Notre Dame du Lac.

Eupatorium purpureum, L.

Solidago bicolor, L. var. *concolor*, Torr. and Gray. Same locality.

Solidago macrophylla, Pursh. Same locality.

Solidago neglecta, Torr. and Gray. Grand Falls.

Solidago serotina, Ait. Notre Dame du Lac.

Erigeron annuus, Pers. Same locality.

Erigeron Canadensis, L. Same locality.

Erigeron hyssopifolius, Michx. Grand Falls.

Erigeron strigosus, Muhl. Notre Dame du Lac.

Aster diffusus, Ait. Same locality.

Aster macrophyllus, L. Same locality.

Aster puniceus, L. Same locality.

Aster umbellatus, Mill. Same locality.

Anaphalis margaritacea, (L.) Benth. and Hook. Same locality.

Achillæa Millefolium, L. Same locality.

Chrysanthemum Leucanthemum, L. Same locality.

Artemisia caudata, L. Grand Falls.

Artemisia vulgaris, L. Notre Dame du Lac.

Senecio aureus, L., var. *Balsamitæ*, T. and G. Grand Falls.

Cnicus arvensis, (L.) Hoffm. Notre Dame du Lac.

Arctium Lappa, L. Same locality.

Hieracium Canadense, Michx. Same locality.

Hieracium scabrum, Michx. Same locality.

Prenanthes altissima, L. Same locality.

Prenanthes serpentaria, Pursh. Grand Falls.

Lactuca leucophæa, (Willd.) Gray. Notre Dame du Lac.

Sonchus arvensis, L. Cacouna.

CAMPANULACEÆ.

Lobelia Kalmii, L. Notre Dame du Lac.

Campanula rotundifolia, L. Grand Falls.

VACCINIACEÆ.

Vaccinium Canadense, Kalm. Notre Dame du Lac.
Vaccinium Pennsylvanicum, Lam. Same locality.

ERICACEÆ.

Cassandra calyculata, (L.) Don. Notre Dame du Lac.
Andromeda Polifolia, L. Same locality.
Kalmia angustifolia, L. Same locality.
Ledum latifolium, Ait. Same locality.
Chimaphila umbellata, (L.) Nutt.

MONOTROPEÆ.

Monotropa uniflora, L. Notre Dame du Lac.

OLEACEÆ.

Fraxinus viridis, Michx. A form with pubescent branchlets.

GENTIANEÆ.

Halenia deflexa, (Smith) Griseb. Notre Dame du Lac.

BORAGINEÆ.

Mertensia maritima, (L.) Gray. Cacouna.
Myosotis laxa, Lehm. Notre Dame du Lac.

SCROPHULARINEÆ.

Linaria vulgaris, Mill. Notre Dame du Lac.
Chelone glabra, L. Same locality.
Veronica Americana, Schwein. Same locality.
Castilleia pallida, Kunth. Grand Falls.
Euphrasia officinalis, L. Notre Dame du Lac.
Rhinanthus Crista-Galli, L. Same locality.

LENTIBULARIEÆ.

Utricularia vulgaris, L. Dubé's Lake, Termiscouata.
Utricularia intermedia, Hayne. Same locality.

LABIATÆ.

Mentha Canadensis, L., var. *glabrata*, Benth. Notre Dame.
Nepeta Cataria, L. Same locality.
Brunella vulgaris, L. Grand Falls, and Notre Dame du Lac.
Scutellaria galericulata, L. Notre Dame du Lac.
Scutellaria lateriflora, L. Same locality.
Stachys palustris, L. Same locality.
Galeopsis Tetrahit, L. Same locality.

PLANTAGINEÆ.

Plantago maritima, L. Cacouna.

CHENOPODIACEÆ.

Atriplex patula, L., var. *hastata*, Gray. Cacouna.

POLYGONACEÆ.

Polygonum aviculare, L. Notre Dame du Lac.

Polygonum Hydropiper, L. Same locality.

Polygonum lapathifolium, Ait., var. *incanum*, Koch. Same locality.

Rumex Acetosella, L. Grand Falls.

Rumex salicifolius, Weinm. Cacouna.

Rumex Brittanicus, L. Notre Dame du Lac.

EUPHORBIACEÆ.

Euphorbia Helioscopia, L. Notre Dame du Lac.

MYRICACEÆ.

Myrica Gale, L. Notre Dame du Lac.

CUPULIFERÆ.

Betula papyracea, Ait. Grand Falls.

Alnus viridis, DC. Notre Dame du Lac.

Corylus rostrata, Ait. Grand Falls.

SALICINEÆ.

Salix discolor, Muhl. Notre Dame du Lac.

Salix humilis, Marsh. Same locality.

Salix lucida, Muhl. Same locality.

Populus balsamifera, L. Same locality.

Populus tremuloides, Michx. Grand Falls.

ORCHIDEÆ.

Spiranthes Romanzoffiana, Cham. Notre Dame du Lac.

Habenaria hyperborea, R. Br. Same locality.

Habenaria psycodes, (L.) Gray. Same locality.

IRIDEÆ.

Iris versicolor, L. Notre Dame du Lac.

LILIACEÆ.

Streptopus amplexicaulis, (L.) DC. Notre Dame du Lac.

Streptopus roseus, Michx. Same locality.

Smilacina trifolia, (L.) Desf. Same locality.

Maianthemum Canadense, Desf. Same locality.

Tofieldia glutinosa, Willd. A form with pedicels four to six lines long in fruit. Grand Falls.

Clintonia borealis, (Ker.) Raf. Notre Dame du Lac.

JUNCACEÆ.

Juncus effusus, L. Notre Dame du Lac.

Juncus filiformis, L. Same locality.

J. Canadensis, Gay, var. *coarctatus*, Engelm. Same locality.

TYPHACEÆ.

Sparganium simplex, Huds., var. *Nuttallii*, Engelm. (?) Same locality.

ALISMACEÆ.

Sagittaria variabilis, Engelm., var. *hastata*, Engelm. Notre Dame du Lac.

NAIADACEÆ.

Potamogeton natans, L. Same locality.

Potamogeton Pennsylvanicus, Cham. (*P. Claytonii*, Tuckerm.), fide Morong.

ERIOCAULEÆ.

Eriocaulon septangulare, With. Dubé's Lake, Termiscouata.

CYPERACEÆ.

Carex rostrata, With., var. *utriculata*, Bailey. Notre Dame du Lac.

Carex hystricina, Muhl. Same locality.

Carex flava, L. Same locality.

Carex scoparia, Schk. Same locality.

GRAMINEÆ.

Spartina cynosuroides, Willd. Notre Dame du Lac.

Deyeuxia Canadensis, (Beauv.) Hook. Same locality.

Glyceria Canadensis (Michx.) Trin. Same locality.

Elymus mollis, Trin. Cacouna.

CONIFERÆ.

Thuja occidentalis, L. Grand Falls.

EQUISETACEÆ.

Equisetum sylvaticum, L, Notre Dame du Lac.

FILICES.

Asplenium Filix-fœmina, (Swartz) Bernh. Notre Dame du Lac.
Phegopteris polypodioides, Feé. Same locality.
Phegopteris Dryopteris, (L.) Feé. Same locality.
Aspidium spinulosum, Swartz. Same locality.
Cystopteris bulbifera, (Swartz) Bernh. Grand Falls.
Aspidium marginale, Swartz. Same locality.
Osmunda Claytoniana, L. Notre Dame du Lac.

OPHIOGLOSSACEÆ.

Botrychium Virginianum, Swartz. Notre Dame du Lac.

LYCOPODIACEÆ.

Lycopodium clavatum, L. Notre Dame du Lac.
Lycopodium complanatum, L. Same locality.
Lycopodium dendroideum, Michx. Same locality.

Sherardia arvensis.

So much has been said of this plant in the BULLETIN, that I am moved to call attention to some facts in its life-history that merit attention. I suppose in the work of most botanists' lives, there is a large amount of "unfinished business," which we hope to take up and consider, but which, as years roll over us, we feel may never be reached. Long ago I had hoped to take up a further study of *Sherardia*. As the time may never come, I throw out what I have noted for others to build on if they feel so disposed.

I have looked for dimorphism, common in allied genera, and at one time thought I had detected it. But the pistil grows after the stamens have reached their final length. This explains why the pistil seems sometimes equal and sometimes longer than the stamens.

The stamens have a curious fashion of recurving at the angles of the corolla-tubes the day after the anthers mature, but they assume an erect position the following day.

The seeds are very small, but the cotyledons or seed-leaves are remarkably large. I have sometimes seen them half an inch in diameter. In poor soil they are a quarter of an inch. The succeeding nodes have leaves four in a whorl, and these four are also large, orbicular and abruptly pointed.

When the buds in the axils develop so as to form side branches, the character of the foliage wholly changes. The whorls then consist of five leaves, and these are narrowly lanceolate or subulate. I have said when the buds in the axils develop, but there is commonly but one branch from the whorl of four leaves. Three buds remain dormant, if they exist at all, so that the branches have a forked character. In the following stage there are six leaves in the whorl.

There is no intermediate stage between the large round-leaved verticil of four, and the subsequent narrow four-leaved whorls. *Natura non facit saltus* does not apply in this case.

In the early quaternary condition of the foliage, one cannot fail to note the similarity between many *Galiums* with broad, roundish leaves, of which *Galium circæzans* may be named as the type, and the subsequent growth to that of other *Galiums* with harder and rigid leaves.

The "unfinished business" was to examine how far these facts might help us to understand the genesis of *Galium*. The dimorphism in the foliage is interesting, though we find no dimorphic flowers.
THOMAS MEEHAN.

Index to Recent American Botanical Literature.

Æcidium on Juniperus Virginiana.—W. G. Farlow. (Bot. Gazette, xii., pp. 205-207)

In this paper Prof. Farlow describes a new species of *Æcidium* (*Æ. Bermudianum*), from specimens collected by himself in 1881 in Bermuda, and others this year in Mississippi, by F. S. Earle, growing on *Juniperus Bermudiana*, and *J. Virginiana*.

Botanical Bonanza.—F. E. Boynton. (Pop. Sci. Month., xxxi., pp. 653, 654.)

An enthusiastic note on the flora of the region twenty miles around the point where North and South Carolina and Georgia come together.

Calochortus—Fertilization of.—John M. Ordway. (Papers New Orleans Acad. Sci., i., pp. 53, 54.)

Catalogue provisoire de Plantes Phanerogames et Cryptogames de la Basse-Louisiane, Etats Unis d'Amerique.—A. B. Langlois (Pamphlet, 8vo., pp. 35, Pointe-a-la-hache, 1887.)

A catalogue of 1194 Phanerogams, 20 Pteridophytes, about 130 Bryophytes and a large number of Fungi, the result of the author's eight years diligent botanizing in Plaquemines Co., Louisiana. The list is prefaced by some general remarks regarding the Flora, the great abundance of lower cryptogamous plants being explained by the great humidity. Copies of the pamphlet (which appears to have been printed in St. Etienne, France) may be had of the author for twenty-five cents.

Caulophyllum thalictroides.—C. G. Lloyd. (Drugs and Med. North Am., ii., p. 141-162; illustrated.)

Champia parvula, Harv.—On the Structure of the Frond in.—Robert Payne Bigelow. (Proc. Amer. Acad. Arts and Sci., xxiii., pp. 111-120; VII Contribution from the Cryptogamic Laboratory of the Museum of Harvard University; reprinted.)

The results obtained are as follows: The apical growth is from a cluster of cells, each of which is at the tip of one of the longitudinal filaments; each cell divides to form the adult filament and the cortex. The diaphragm and bulb-cells originate from the filaments as outgrowths, and the branches each have their origin opposite a filament.

Comparative Chemistry of Higher and Lower Plants.—Helen C. DeS. Abbott. (Amer. Nat., xxi., pp. 719-730 and 800-810; illustrated by diagrams.)

This is an abstract of a lecture delivered in April last, before several of the Washington societies on a subject which has as yet obtained but little recognition in America. Among the many interesting suggestions, we note "the largest ash-percentages are found among those plants lower in the evolutionary scale," and that the green of chlorophyll is generally darker in plants of more complex organization, though to this we might offer an exception in the dark-greens of *Anthoceras* and other Hepatics.

Curl of Peach Leaves—A Study of the Abnormal Structure, induced by Exoascus deformans.—Etta L. Knowles. (Bot. Gaz., xii., pp. 216-218; one plate.)

Desmids of the Pacific Coast.—Francis Wolle. (Bull. Cal. Acad. Sci., ii., pp. 432-437.)

A list of 82 species from near Lake Tahoe, Cal., with notes on some other fresh water Algæ.

Dispersion of Seeds of Euphorbia marginata.—J. Schneck. (Bot. Gaz., xii., pp. 225, 226.)

Describes the sudden bursting of the capsule.

Drugs and Medicines of North America.

It is announced that on the completion of Volume ii., the work will not be continued as a periodical, but will be issued in book form.

Excursion to the Platte.—Harvey Thomson. (Bot. Gaz., xii., pp. 219-221.)

A general account of the floral characters of the region.

Food and Fibre Plants of the North American Indians.—J. S. Newberry. (Pop. Sci. Month., xxxii., pp. 31-46; also reprinted, pp. 16.)

This is a paper read before the Club, Nov. 9th, 1886, but considered by the author as of too popular a nature for admission into the BULLETIN. The following plants are noted: Maize (*Zea Mays*), Beans (*Phaseolus*), Pomme blanche (*Psoralea esculenta*), Camass (*Camassia esculenta*), Biscuit-root or Couse (*Peucedanum* sp.), Ground-nut (*Apios tuberosa*), Jerusalem Artichoke (*Helianthus tuberosus*), Sunflower (*H. annuus*), *Wyethia robusta*, the various Nut Pines (*PP. Sabiniana, Coulteri, albicaulis flexilis, edulis* and its var. *monophylla, Parryana, cembroides*), Cactus fruits (species of *Opuntia, Cereus* and *Echinocactus*), *Nuphar polysepala*, Acorns (*Q. lobata* and *agrifolia*), Mezquite (*Prosopis juliflora*), *Nelumbium luteum, Zizania aquatica*, several species of *Agave*, the lichen *Evernia sarmentosa*, Sotol (*Dasylirion Texanum*), Soap Plants (*Chlorogalum pomeridianum, Yuccæ* and *Sapindus marginatus*), Berries of all kinds, Nuts, and pine bark from *P. ponderosa*. It is an important paper, as it gives Dr. Newberry's notes, made over twenty-five years ago, among many tribes of the Far West then first visited by the whites.

Forests and Climate.—Joseph F. Joor. (Papers New Orleans Acad. Sci., i., pp. 72-80.)

Forests of the United States.—Chas. Mohr. (Papers New Orleans Acad. Sci., i., pp. 19-39.)

A popular and readable article by a veteran in the study of Forestry.

Fungi from various Localities—New Species of.—J. B. Ellis and B. M. Everhart. (Journ. Mycol., iii., pp. 116-118.)

Eight new species described.

Fungi of the Pacific Coast, V.—H. W. Harkness. (Bull. Cal. Acad. Sci., ii., pp. 438-447.)

A long list of species from various parts of California and Nevada. Two new forms are described.

Gleditschia triacanthos. (Garden, xxxii., 1887, p. 304; illustrated.)

Grindelia glutinosa in Wisconsin.—W. M. Wheeler. (Science, x., p. 180.)

Reports a single plant growing along a railway.

Hypocreaceæ—Additions to.—J. B. Ellis and B. M. Everhart. Journ. Mycol., iii., pp. 113-116.)

Liriodendron tulipifera. (Garden, xxxii., p. 262.)

Manitoba—Notes on the Botany of.—R. Miller Christy, F.L.S. (Journ. Bot., xxv., pp. 271-276 and 290-301.)

A general account of the floral characters of the province.

Melanconis dasycarpa.—J. B. Ellis. (Journ. Mycol., iii., p. 118.)

Mr. Ellis suspects this species to be the same as *M. Everhartii.*

Notes concerning Development and Fertilization of Plants.—John Kruttschnitt. (Papers New Orleans Acad. Sci., i., pp. 40-52.)

A paper chiefly remarkable for its surprises and its mistakes in spelling and typography; the author has not yet been able to find pollen tubes entering the micropyle, and describes the development of a fungus (?) from a Gregarine!

Ostrich Fern (*Onoclea Struthiopteris*)—*The Development of the.*—Douglas Houghton Campbell, Ph.D. (Memoirs Boston Soc. Nat. Hist., iv., pp. 17-52, plates 4-7.)

This valuable paper comes as the successful thesis for the "Walker Prize Essay" competition of 1886, and the author is to be congratulated for his work and his reward. The first page gives an abstract of the contents, and we quote therefrom:

"The presence of a third coat in the spore. The marked diœcism displayed by the prothallia. Formation and development of the apical cell of the prothallium. Continuity of the protoplasm in the cells of the prothallium. Development of the antheridium and antherozoids. Absence of the ventral canal-cell in the archegonium. Succession of the divisions of the embryo and the establishment of the apical cells of its different members. Development of the different tissues of the embryo. Development of the leaf from the apical cell, and the relation of the different tissues of the leaf to the segments of the apical cell. Method of formation of the pinnæ. Development of the stem from the apical cell. Development of the sporangium."

"The sporangia in this fern are borne in great numbers in the back of the fertile fronds, and as these remain standing through the winter after the sterile fronds have decayed, spores can be obtained at all seasons of the year. These retain their vitality for several months after being gathered, so that when the plants are common, abundance of material is constantly on hand. This fact, together with the ease with which the spores can be germinated, makes the plant a specially valuable one for study."

Philadelphus microphyllus, Gray. (Gard. Chron. ii., 1887, p. 156; illustrated.)

Plantæ Novæ Hispaniæ.—Martinius Sessé et Ioseph Mariannus Mociño. (La Naturaleza, II Ser., i., pp. 16.)

In this valuable Mexican periodical we find a list of plants dating from the time of Chas. IV., which has been lying *perdido* in Spain and is now printed for the first time. The classification is the Linnæan, and the descriptions are in Latin. The title page announces plates from the original drawings, but there are none in this number.

Plants of the Island of Rhode Island—Native, III.—W. C. Rives, Jr. and W. W. Bailey. (Proc. Newport Nat. Hist. Soc., 1886-'87, pp. 32-35.)

This completes the list begun in a former number.

Potamogeton Mexicanus, Bennett. (Journ. Bot., xxv., p. 289.)

This new Potamogeton belongs to the same group as *P. fluitans*, with a fruit resembling *P. tricarinatus* but much larger.

P. Claytonii, Tuck. (Silliman's Journ., 1843,) is antedated by *P. Pennsylvanicus*, Cham. (Linnæa, 1827,) as specimens "in Willdenow's herbarium at Berlin, are named by Chamisso and intialled by Prof. Tuckerman as his *Claytonii*."

Proterogyny in Datura meteloides.—J. Schneck. (Bot. Gaz., xii., pp. 223, 224.)

Psilotum triquetrum, Sw. (Gard. Chron., ii., p. 191; illustrated.)

Tokutaro Ito gives an account of the varieties of this Cryptogam which are used for ornamental house plants in Japan, and gives a series of sketches of these forms.

Report of the Botanist to the Board of Regents of the University of the State of New York for 1885.—Chas. H. Peck. (39th Ann. Rep. Trustees State Mus. Nat. Hist., pp. 30-73; two plates.)

Professor Peck's present report is as interesting as those that have preceded it, all valuable contributions to the Flora of New York. 120 species new to the herbarium, and 84 supplementing those already represented, all from this State, were mounted during 1885. 110 of the new ones are Fungi collected by Mr. Peck himself. Of plants not before reported are *Solidago speciosa*, Nutt., from Brunswick, Rensellaer Co., and *Eragrostis Frankii*, Meyer, from Troy, both communicated by Dr. Howe, and a large number of Fungi, among which are new species in the genera, *Agaricus*, *Russula*, *Boletus*, *Clavaria*, *Tremella*, *Phyllosticta*, *Phoma*, *Dendrophoma*, *Sphæropsis*, *Coniothyrium*, *Septoria*, *Rhabdospora*, *Zythia*, *Pestalozzia*, *Godronia*, *Læstadia*, *Sphærella*, *Diaporthe* and *Leptosphæria*.

Under "Remarks and Observations" are a number of notes on new stations and peculiarities of several species. There is also a critical revision of New York species of the fungus genera *Pleurotis*, *Claudopus* and *Crepidotus*, in which a new species of the last named is given.

Report of the Botanist of the New York Agricultural Experiment Station.—J. C. Arthur. (2d Ed., 5th Ann. Rep. N. Y. Exp. Station, pp. 259-296; reprinted.)

Titles of papers contained in this report may be found in the Index to Current Literature in March BULLETIN.

Report of the Botanist, U. S. Dept. Agriculture, 1886.—George Vasey. (Rep. Comm. Agric., 1886, pp. 69-93; twenty-one plates; also reprinted.)

Dr. Vasey's present report deals with the following topics: History of the Division; Work on Grasses; Relation to other

Branches of the Department; some native Clovers, (*Trifolium fucatum*, *T. megacephalum*, *T. involucratum*, *T. stoloniferum* and *T. Carolinianum* described and figured). Mr. Crozier's contribution to the volume is on "Weeds of Agriculture," giving practical information to aid in the eradication of weeds and special attention to *Cnicus arvensis*, *Arctium Lappa*, *Xanthium Canadense*, *Ambrosia artemisiæfolia*, *Chrysanthemum Leucanthemum*, *Abutilon Avicennæ*, *Solanum Carolinense*, *Echium vulgare*, *Rumex Acetosella*, *Lychnis Githago*, *Chenopodium album*, *Ranunculus acris*, *R. bulbosus*, *Barbarea vulgaris*, *B. præcox*, *Chelidonium majus* and *Capsella Bursa-pastoris*, all of which are figured.

Report of the Chief of Division of Forestry U. S. Department of Agriculture, 1886.—B. E. Fernow, (loc. cit., pp. 149-226; diagrams; also reprinted).

There is so much of scientific interest and practical suggestion in Mr. Fernow's report that we cannot hope to do it justice in the space at our command. Among the most important subjects discussed are "Forest Planting and Management in the United States;" it appears that there are as yet very few extensive forest plantations, though there are numerous small ones, forming in the aggregate quite a considerable area, and affording encouragement for the creation of new forests; however, "this hopeful prospect does not exist in regard to the remaining natural forests." The prosecution of biological studies of our timber trees is earnestly urged and an outline of the main points of inquiry is given; there is also a preliminary list of our ninety most important timber trees, with their distribution, quality and uses of wood and practical remarks on their planting.

Report of the Mycological Section, U. S. Department of Agriculture, 1886.—F. Lamson Scribner. (loc. cit., pp. 95-138; eight plates, maps and diagrams).

This paper contains the results of investigations conducted by Mr. Scribner on several injurious Fungi, among them *Peronospora viticola*, the Downy Mildew; *Uncinula spiralis*, the Powdery Mildew; *Physalospora Bidwellii*, the Black-rot; *Sphaceloma Ampelinum*, Arachnose; *Cercospora Apii*, Celery-leaf Blight; a species of *Cladosporium*, the Orange-leaf Scab., and *Phytoph-*

thora infestans, Potato-rot; there is more about Pear Blight written by Dr. J. C. Arthur, and a chapter on *Scoleotrichum graminis*, a disease of Orchard Grass, by Prof. Trelease. All these Fungi are figured.

Report on Botanical Work in Minnesota for the year 1886.—J. C. Arthur and others. (Geol. and Nat. Hist. Surv. Minn., Bull. No. 3, pamph. pp. 56, St. Paul, 1887).

Mr. Warren Upham's valuable catalogue of the Minnesota Flora is here admirably supplemented by the report of work in the Vermillion Lake district made up of: (1). Sketch of the Flora of Vermillion Lake and vicinity, by Prof. L. H. Bailey, Jr.; (2). A list of plants collected between Lake Superior and the International Boundary, by Professors Arthur, Bailey and Mr. E. W. O. Holway in which we note *Littorella lacustris*, a new variety of *Salix lucida* and *Carex penguis*, Bailey, n. sp. Dr. Beal determined the grasses, Prof. Barnes the mosses and Prof. Underwood the hepatics. A large number of Thallophyta and Protophyta are enumerated, among the latter *Synchytrium Asari*, Arthur and Holway, n. sp. (3). Plants observed or collected on the Bluff at Duluth, by Prof. Bailey. (4). Supplement to the Flora of Minnesota, in which Mr. Warren Upham brings together the additions to the State Flora, corrections and new localities, and (5). Prof. Bailey gives a list of species noted on Hunter's Island, British America.

Sarraceniaceaæ or Pitcher Plants.—Observations on the. John Kruttschnitt. (Papers New Orleans Acad. Sci., i., pp. 81-84).

Descriptions of the glands, which are also roughly figured, and of the foot of a fly. "The fly has evidently a task to perform in connection with the Sarraceniaceæ; it consists in exciting the plant to certain actions by the gentle friction exerted by the padded foot of the fly." And as an objection to the theory of development, "the Sarraceniacæ after it has obtained its full growth is brought into intimate connection with the fly; but the fly derives apparently no advantage from the Sarraceniacæ!"

Structure of certain Timber Ties; Behavior and Causes of their Decay in the Roadbed. P. H. Dudley, (U. S. Dept. Agric., Forestry Division, Bull. No. 1., pp. 31-65; nineteen plates).

We find here collected the results of Mr. Dudley's prolonged studies on native woods used for railroad ties and the fungi which destroy them, portions of which he has given before this club and other organizations. The plates are reproductions of his wonderful photomicrographs, and in most cases are excellent. The woods discussed and illustrated are those of *Quercus alba*, *Castanea vulgaris*, var. *Americana*, *Chamæcyparis sphæroidea*, *Pinus palustris*, *Tsuga Canadensis*, *Larix Americana* and *L. occidentalis*.

Walking-fern in Iowa.—W. R. Lighton. (West Amer. Sci., iii., p. 193.)

Describes the occurrence of *Camptosorus* on sandstone near Ottumwa, Wapello Co.

Botanical Notes.

On a Fossil Marine Diatomaceous Deposit from Oamaru, New Zealand.—E. Grove and G. Sturt, F.F.R.M.S. (Journal of the Quekett Microscopical Club, Sept., '86, Jan., '87, May, '87, Aug., '87; pp. 50; seven plates, containing 123 figures.)

This series of papers, just completed, is a most valuable and exhaustive report upon this unique deposit. It would seem as though the microscopic life of these far away islands of the Pacific presents as strange and unexpected features as do the higher plant forms and the fauna of those regions. Altogether the authors have recorded 273 species found in the deposit. Of these, they have figured and described 118 species as new. This may appear to be a large number, but an acquaintance with the deposit, and a careful comparison of the species figured with actual specimens, will afford convincing testimony that the number is not too great. Indeed, one cannot help admiring the conscientious care which the authors have exhibited in the investigation, and their careful regard for the rights of other investigators. Not the least attractive feature of the paper is the plates, which are remarkably well executed. C. H. K.

Lichenotheca Universalis. Under this title Professor Hugo Lojka, of Budapest, had projected the issue of a series of specimens illustrating the lichen flora of the earth. He had enlisted as contributors a large number of botanists and collectors, and had issued five fascicles of fifty numbers each, and had others in preparation, when his death, which occurred Sept. 7th of this year, after a painful illness, has, it is to be feared, put an end to this important undertaking.

The parts of the world chiefly represented in the fascicles already issued, are: Europe, Southern Africa, North America, New Holland and New Zealand. This country is represented by twenty-eight species. Two of them, *Calicium faculatum* and *Lecidea* (*Biatora*) *holopolia*, are unedited species of Tuckerman from the Pacific coast. Two others, *Umbilicaria corrugata*, Nyl., from Newfoundland, and *Verrucaria* (*Pyrenula*) *aspistea*, Ach., from New Jersey, have not been previously published as belonging to this country. No. 17, *Lecanora miculata*, Ach., described by Tuckerman in his synopsis, is not present. But, after the publication of his synopsis, Prof. Tuckerman expressed the opinion that it was only *L. subfusca*. A considerable number of other North American species had been sent to Prof. Lojka, and would have been issued in the fascicles for this year, which it is to be hoped, were in a state of sufficient forwardness to be distributed.

The classification and nomenclature of this collection is that of Nylander, and it will require some knowledge of lichen systems to place many of the species in the genera adopted by Tuckerman. Two of the finest and rarest species are *Endocarpon* (*Dermatiscum*) *Thunbergii*, and *Parmelia* (*Omphalodium*) *Hottentum*, from the Cape of Good Hope, which those who have the good fortune to possess the collection, can compare with the single American species of these genera. Prof. Lojka does not seem to have known Nylander's genus *Dermatiscum*, but the apothecia of the specimens of *D. Thunbergii* are distinctly *Lecanorine* in his specimens. The name *Cladonia lacunosa* ought not to have been given for *C. Boryi*, Tuck., the name under which the species was first described and published, the other having been merely a herbarium designation.

No. 186 is given as *Graphis angustata*, Eschw., a Brazilian lichen, the spore character of which, so far as I know, has not been investigated, and which is therefore, like most of the species of the older botanists, especially the tropical ones, uncertain. It is very unlikely that a distinctively Brazilian *Graphis* should occur in New Jersey, and I can only look upon the lichen as a depauperate state of the very common *G. scripta*. *Pyrenula aspistea*, Ach., is given on the authority of Nylander, although in his Expositio Pyrenocarpeorum he had considered it as hardly differing from *P. nitida*, var. *nitidella*, Tck. But in his Lichens of New Grenada he considered it as a subspecies of *P. nitida*, differing only in its smaller spores. No. 12, given as *Umbilicaria Pennsylvanica*, from Newfoundland, is, as Nylander has pointed out in Flora, *U. pustulata*.

At least three sets of this collection, of which we suppose that only from twenty-five to thirty have been issued, have been sent to this country, one of them to the Smithsonian Institution, while the others are in private hands. H. WILLEY.

Annals of Botany. Edited by Isaac Bayley Balfour, Professor of Botany in the University of Oxford, Sydney Howard Vines, Reader in Botany in the University of Cambridge, and William Gilson Farlow, Professor of Cryptogamic Botany in Harvard University, Cambridge, Mass. Clarendon Press, Oxford.

This forms an important addition to the list of botanical magazines and promises to occupy a place that no other has heretofore filled. Although many doubts and criticisms have been expressed by several of the English journals, we venture to say that on this side of the Atlantic, at least, it is just what was wanted by those who have not access to a large library where all the expensive European magazines may be consulted.

A varying number of parts, issued at intervals, will complete a volume, the subscription for which will be a guinea, subscribers receiving the parts as they appear; the price of individual parts will vary according to their size and contents. The first part is marked 8 s. 6 d., and contains four original articles, occupying seventy pages, accompanied by six excellent plates.

No. 1. By H. Marshall Ward and John Dunlop. On some points in the Histology and Physiology of Fruits and Seeds of *Rhamnus* (Plates I and II.)

No. 2. By Walter Gardiner and Tokutaro Ito. On the structure of the mucilage-secreting cells of *Blechnum occidentale*, L., and *Osmunda regalis*, L. (Plates III and IV.)

No. 3. By Agnes Calvert and L. A. Boodle. On laticiferous tissue in the pith of *Manihot Glaziovii*, and on the presence of Nuclei in this Tissue (Plate VI).

No. 4. By W. H. Gregg. Anomalous thickening in the roots of *Cycas Seemanni*, R. Br. (Plate VI).

Under *Notes*, F. W. Oliver calls attention to a "Phenomenon analagous to leaf-fall" in *Rubus australis;* J. R. Vaizey describes some interesting experiments with Eosin on *Polytrichum formosum*, Hedw., and *Splachnum sphæricum*, L., in determining the "Transpiration of the Sporophore of the Musci;" J. H. Blake describes the "Prickle-pores of *Victoria regia;* Agnes Calvert, the laticiferous tissue in the stem of *Hevia Braziliensis*, and Isaac Bayley Balfour discusses the terms "sporophore" and "sporophyte."

Under *Reviews*, that of "Sachs' Lectures on the Physiology of Plants," translated by H. Marshall Ward, occupies seven pages, and will be read with interest by all who have not the original.

It concludes with a Record of Current Literature, of forty-one pages, including books, pamphlets and periodical literature, arranged according to countries and magazines. This record has been severely criticised by the Journal of Botany for the omission of the initials of authors. It does bring about some confusion if there be no opportunity of verifying from the originals.

A Correction.—Dr. Watson calls our attention to a mistake in the Report of the Proceedings of the Botanical Club, A. A. A. S. (this volume, p. 209), where the White Mountains are given as a locality for *Arabis petræa;* the species has not yet been found in New Hampshire, though it probably will be.

Proceedings of the Club.

The regular monthly meeting was held October 11th, Dr. Newberry in the chair and twenty-eight persons present.

Mrs. Henry Herrmann, Robert G. Eccles, M.D.; M. L. Delafield, Jr.; G. Degener and Miss Jeannette B. Greene were elected Active Members.

Miss Susan M. Hallowell, of Wellesley College; Mrs. Katharine B. Claypole and Prof. E. W. Claypole, of Akron, Ohio; Dr.

Sereno Watson, of Cambridge, Mass.; Prof. W. J. Beal, of Agricultural College, Mich.; Mr. R. P. Bigelow, of Washington, D. C.; Mr. Robert B. Lawrence, of Flushing, Long Island; Mr. Henry Willey, of New Bedford, Mass.; Rev. W. M. Beauchamp, of Baldwinsville, N. Y.; Prof. Wm. Trelease, of St. Louis, Mo.; Mr. J. J. Davis, of Racine, Wis.; Dr. E. L. Sturtevant, of Geneva, N. Y.; Anna H. Searing, M.D., of Rochester, N. Y.; Miss Frances M. Hazen, of South Hadley, Mass., and Rev. Jas. Fowler, of Kingston, Canada, were elected Corresponding Members.

The committee appointed to prepare a suitable memorial on the death of Mr. Julius Bisky, reported as follows:

The sudden death of Mr. Julius Bisky in the midst of his life's usefulness and success is not only a heavy calamity to his family but to the community in which he lived and to this Club, of which he was one of the most promising and useful among the younger members. He was born of Hungarian parentage in New York City, twenty-six years ago. At the age of 13 years he was fortunate in becoming a pupil of Professor Schrenk and under his instruction developed a remarkable love of flowers and an unusual talent for botanical study. He subsequently studied at the New York College of Pharmacy and was graduated 2d in his class. He commenced business as a druggist in Flushing, in 1881, and soon became a favorite in all classes of the community for his professional skill and his genial manner. His proficiency also as a botanist caused his speedy recognition as the local authority on all botanical questions. Mr. Bisky had nearly completed at the time of his death an exhaustive catalogue of the Flora of Queens County, a work which had engaged his attention for more than three years. By his patient industry and discrimination he had added largely to the list of Long Island plants and by his intelligent grouping and selection he has greatly simplified the work of those who shall follow him in this field, and the many excellencies of his character will endear his memory to all who knew him.

J. W. BARSTOW.
J. F. POGGENBURG.

The report was accepted and the committee discharged.

The committee appointed to prepare a memorial of the late Mr. George M. Wilber, reported as follows:

Mr. George M. Wilber, one of the Charter Members of the Torrey Botanical Club, died at Cromwell, Conn., June 22d, 1887. The following brief sketch of his life is respectfully submitted by your committee.

Mr. Wilber was born in the town of Washington, Dutchess County, N. Y., December 28th, 1831, and in that town passed his boyhood. He was educated at Amenia Seminary. He began his professional career as a teacher at an early age, in one of the free schools of Poughkeepsie. Afterwards he became an instructor in Eastman's Business College, in the same city, and later in the Poughkeepsie Military Institute. He came thence to New York, bringing with him the enviable reputation of a conscientious teacher, an honest man and a worthy citizen. From that time until a few months before his death he taught in the Grammar School at 140 West 20th Street.

Mr. Wilber was interested in several departments of natural science, but his chief delight was the study of plants. He attended the meetings of the Club with regularity, was for many years its Recording Secretary, and, by frequent field excursions made himself familiar with the flora of the region about this city. In private life he was warm hearted, generous, hospitable. He made strong friendships, and over his grave rises that fairest of monuments the tender remembrance of those who knew him best.

BENJAMIN BRAMAN.
OLIVER R. WILLIS.

The report was accepted and the committee discharged.

The Committee of Entertainment of Botanists of the A. A. A. S. reported in full and was discharged.

The Secretary called attention to a memorial prepared by the American Forestry Congress, addressed to the next Congress of the United States, urging the protection of the public timber lands, and asking for signatures.

Dr. Britton remarked on the flora of the region known as Germany Flats, in Sussex County, N. J., recently explored by Prof. Porter and himself. Among the plants of greatest interest found were *Polygonum Hartwrightii*, Gray, *Solidago uliginosa*, Murr. and *Betula pumila*, Michx.

Mr. Sterns stated that *Trapa natans* was abundant in a pond at East Hartford, Conn. Dr. Newberry remarked on the past history of *Trapa* and stated that its fossil remains are plentiful along the Yellowstone River and that in Tertiary times it was abundant in the northwest.

Mrs. Britton showed specimens of *Thymus Serpyllum* from the ravine at the outlet of Morris Pond, near Sparta, N. J., and stated that it was abundantly naturalized there.

Mr. Sterns exhibited some of the epidermis of the inner surface of the leaf of *Yucca aloifolia*, used as a substance on which to paint, it having a remarkably smooth surface.

Miss Steele read a description of a fungus (*Aspergillus niger*) found in figs, the note communicated by Prof. A. B. Seymour. She also remarked on the abundance of *Potentilla fruticosa* in Western Connecticut and Massachusetts, where it is commonly called "Hardhack." Mr. J. I. Northrop read the announced paper on "the Flora of Termiscouata County, P. Q., Canada," illustrated by the specimens collected.

BULLETIN

OF THE

TORREY BOTANICAL CLUB.

Vol. XIV.] New York, December 3, 1887. [No. 12.

Remarks on the Group Carolinæ of the Genus Rosa.

By G. N. Best, M.D.

Notwithstanding the labor and thought that have been expended both at home and abroad on the Wild Roses of North America they are yet, at least as far as certain species are concerned, not in a very satisfactory condition to most botanists. One reason for this, as pointed out by M. Crepin,* is that many of the specimens found in the various herbaria are nearly worthless, consisting of a small branch, a few leaves and flowers, without mature fruit. To be available for diagnostic purposes, they should be the whole bush, the upper two-thirds at least, collected when flowering, with fruit later in the season.

Another reason is the variability of certain characters upon whose constancy too much reliance has been placed in the founding of species. Reference is here had to sepals, whether lobed or entire; stipules, whether narrow or dilated, toothed or entire; spines, whether straight, curved or absent. These in many instances are so variable as rather to be considered accidents of growth, depending apparently on peculiarities of soil or location, or both, and of value only in determining varieties. There is no plant perhaps that reflects more its environments than the Rose. Growing at the foot of a hill, in damp rich soil, with stout stems, thick shining leaves, broad stipules and stout curved or reflexed spines, they present a very different appearance from those found at the hill top, where the soil is light and dry, exposed to the sun. Here the stems are slender, branches more diffuse, leaves thinner, stipules narrow and spines straight, or nearly so, often absent in stunted bushes. Seeing the extremes in an herbarium, knowing nothing of the situation in which they grew, one would be strongly inclined to think he had two well-marked species with which to deal. On the other hand, however, could he but see the intermediate forms, their perfect intergradation, he could come to no other conclusion than that he had before him but one.

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* Nouvelles Remarques sur les Roses Americaines.

Hybridization may be invoked as a factor in the production of variant forms, but so far this is only conjectural. When these occur, as they frequently do, blending the characters of supposed species, that they are hybrids is an easy inference ; and they may be so. The best presumptive evidence is sterility in otherwise healthy bushes. Watson, in his excellent monograph, *A History and Revision of the Roses of North America*,* speaking of *Rosa lucida*, Ehrh., says that the fruit is sometimes "oblong-ovate," but attributes this deformity, with fewer seeds, to the work of insects. Dr. Torrey, in *Flora of New York*, states that a similar change is observed at times in the fruit of *Rosa Carolina*, L., and also ascribes it to insect work. With due deference to these acute observers, I am disposed to ask whether it is not probable that the cause at the bottom is not sterility from hybridizing, the insects taking advantage of the space made vacant by the absence of seed, and thus appearing to be the cause when in reality they are not? I am led to this questioning by observing that most frequently this atypic form of hips is seen in bushes in which the characters of *Rosa lucida* and *Rosa Carolina* are blended. If this change depended *de novo* on the work of insects, like changes in other species growing in the same locality should be expected, which, however, is rarely the case.

The time of flowering is a valuable criterion whereby to judge whether different forms are in reality the same species or not. If they commence to bloom at the same time in the same situation, it is reasonable to suppose that they are the same. It is true that two or more good species might flower at exactly the same time, but the presumption is to the contrary. Caution therefore is necessary in not too hastily concluding, when anthesis takes place simultaneously, that we have more than one species, however diverse the forms may appear.

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* Proceedings of the Amer. Acad. of Arts and Sciences, Vol. xx.

The mature fruit has not received the attention it deserves; likewise the seed. I am satisfied that from them both important aids can be derived in the differentiation of species. In the early part of winter the hips of *Rosa Carolina* wither and wrinkle, forming a short but distinct neck; the remaining species of the group Carolinæ, on the other hand, so far as my observation goes, continue plump until the following spring. By this character alone, and especially when taken conjointly with the seed, which is smaller than in either of the other species, *Rosa Carolina* may be known even when divested of flowers and leaves. In like manner, as the result of close study, the fruit and seeds may afford the means of distinguishing other species and putting them on a more permanent basis.

These remarks are intended to be simply suggestive and the end attained for which they are made if they stimulate more earnest work on the part of botanists in solving some of the problems connected with the genus *Rosa*. In the same spirit I have thought proper to advise the dropping of *Rosa lucida*, Ehrh., as a species, and placing it under *R. humilis*, Marshall, as a variety. They commence flowering at the same time; intermediate forms occur that connect them so closely that among a large number of specimens it is well nigh impossible to know to which species some should be assigned. They differ only in a few variable characters which are far from being constant. It is therefore presumed that the best interests of the science are subserved by putting them together. By this arrangement all those forms which show a transition to *Rosa Carolina*, L., and yet in reality are distinct from it, are placed under *R. humilis*, to which they are more closely related.

There is another form found growing on the margins of damp woods, or in the clearings, which in some respects seems intermediate between *Rosa humilis* and *R. nitida*, Willd. This I have also placed under the former as var. *villosa*. It remains for future observation to assign its limits; it is not infrequent in New Jersey.

That the descriptions of Ehrhart's *lucida* and Marshall's *humilis* have been generously dealt with is evident from a perusal of the current text books and manuals. The multiplicity of forms have been disposed of after a Procrustean fashion. In order, therefore, that the reader may understand what is proposed, the leading characters of the Group will be given, followed by those of the species with its varieties, for much of which I am largely indebted to M. Crepin* and Dr. Watson.†

GROUP CAROLINÆ : STYLES DISTINCT ; STEMS WITH INFRASTIPULAR SPINES, OFTEN PRICKLY ; SEPALS DECIDUOUS ; CALYX, RECEPTACLE AND PEDICEL HISPID ; FRUIT GLOBOSE.

Leaflets five to nine, coarsely toothed; fruit remaining plump during winter.

Rosa humilis, Marshall. Stems usually low (1 to 3 ft.), rather slender, with straight slender spines, spreading or sometimes reflexed; stipules narrow, rarely dilated; leaflets usually thin, sometimes glabrous, but commonly more or less pubescent, as also the rachis; flowers corymbose or often solitary; sepals lobed; fruit depressed globose, reddish. (*R. parviflora*, Ehrh.)

Var. LUCIDA, n. v. Stems taller, with stout, curved or reflexed spines, rarely straight; stipules usually dilated, sometimes rounded, margins serrulate or more deeply toothed; leaflets thicker, smooth and shining above, more or less pubescent beneath; sepals slightly lobed or entire; fruit dark red. (*R. lucida*, Ehrh., in part.)

Var. VILLOSA, n. v. Stems low, seldom over 2 ft. high, upper third zigzag, often greenish; stem and branches covered with brownish prickles much shorter than the usually straight spines; leaflets thick, smooth and shining above, villous-pubescent beneath; rachis pubescent, slightly glandular, its nodes surrounded by villous tufts; stipules narrow, margins glandular-ciliate; sepals long, often foliaceous, pinnately lobed; fruit yellowish red. ‡

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* *Primitiæ Monographiæ Rosarum.*

† *loc. cit.*

‡ Var. *villosa* is usually well-marked, but forms occur which show a reversion to the type, with thinner leaves, less villous, less glandular, prickles few or absent, spines often elongated.

Bibliographical Notes on well-known Plants.—VI.

By Edward L. Greene.

Nymphæa and Nuphar.

Since the BULLETIN for September was printed, I have been able to establish as true all, and more than all, which I therein set forth as possible in relation to the priority of Salisbury's division of the old genus *Nymphæa* over that of Smith. The difference in time between the two is greater than I had assumed. Salisbury's monograph was certainly published in 1805, while so late as the middle of November, 1808, that part of the Flora Græca which was to exhibit Smith's disposal of these plants had not yet made its appearance. This is evident from a letter,* written by him at that time, to Dr. Samuel Goodenough, Bishop of Carlisle; and, therefore, Salisbury's *Nymphæa*, which is not that of Smith, antedates it not by one year only, but by three.

The action of Smith was a deliberate attempt to suppress—relegate to oblivion, if he might—Salisbury's monograph as a whole, and to banish his name, in so far as might be possible, from all connection with the nomenclature of these plants. This attempt was made, not without the necessary private consultation with the most scholarly members of his own botanical clique. Salisbury had made it clear to the mind of Sir James that the white water lilies and the yellow were generically different. I quote the language in which he opens the consultation with his Lordship of Carlisle. "Now I want your Lordship's advice, both critical and botanical. Mr. Salisbury [whom I wish in this case to consider as an indifferent person] makes *Nymphæa alba* a distinct genus from *lutea*, and I think rightly." He then proceeds to lay before his chosen counsellor the scheme by which he will make as little as he can of Salisbury's work. He offers sundry objections against *Castalia*, proposes to replace it by *Nymphæa*, and to give to the yellow water-lilies the name *Blephara*. So it appears we should have had that name instead of *Nuphar*, but for the Right Reverend Dr. Goodenough, who frowned upon it in a manner not uncourteous, and recommended in its stead *Nuphar* or *Madonia*, both of which, he showed his correspondent, were classical names which had been applied to the plants by ancient authors. From Goodenough's spirited letter, emphatic in its expression of personal dislike of Salisbury as it is full of zeal for the honor of Grecian gods and goddesses, I must give a few passages. "I am glad now, as I have been at all times heretofore, to receive communications of your literary difficulties." (Sir James had been obliged to ask of him the gender of his proposed name *Blephara.*) "Much as I wish for peace and forbearance, and *condescension to men of low estate* [and in point of scholarship thus must I style Salisbury—of *very* low estate], I must hold up both my hands against allowing Salisbury to desecrate the name *Castalia.* To make the name of the nymph of the fountain where Apollo and all the Muses drank the purest lymph, serve for the denomination of a plant inhabiting foul, stagnating, fetid water, and that, too, in a *Flora Græca*, which is to preserve the memorial of all Grecian excellence in the natural world, will be an offense of the grossest sort: *Religio vetuit.* A bad name, Linnæus says, had better be retained than that a change should be made. But really there is reason in roasting of eggs. You cannot be bound down to a name that is execrable, and which must excite in all minds ideas of execration."

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* Mem. and Corresp. Sir J. E. Smith, i. 576.

One can hardly fail to observe that, in the heat of feeling, the Bishop became a little inconsistent with himself; for in the beginning of his diatribe he holds *Castalia* a sacred name which Salisbury must not be allowed to desecrate, and concludes by pronouncing it execrable. But these are trivialities and do not gravely concern us. The principle now contended for along all popular lines of reform in nomenclature is this: that the oldest Linnæan or post-Linnæan names are those which genera must bear; and it is quite beyond all successful contradiction that *Castalia* of Salisbury is the oldest name, not pre-Linnæan, for the genus which men are still calling *Nymphæa.*

Note on the Color of Caulophyllum thalictroides.

Having seen Mr. Aug. F. Foerste's Morphological Note on *Caulophyllum thalictroides* in the July BULLETIN, I should like to call attention to the color of the plant as it grows on Mount Royal, Montreal. When it first comes up there in the spring, its stem has a dark purple bloom, the bunches of leaves are dark green, with a suggestion of the same purple hue, and the flowers —opening before the leaves unfold—are a dark chocolate brown. On account of its coloring, I had some difficulty in identifying it, and for some time knew it only as "the black plant." By that or some other name descriptive of its dark appearance, it was generally known by people who valued flowers for their ornamental effects only, and it was prized for the contrast it afforded to the prevalent light greens. The specimen in our herbarium from Mount Royal, although dried ten years ago, shows well the colors I have mentioned. So far as I remember, the smaller biternate leaf mentioned in Gray's Manual was always present.

On coming to Ohio I looked in vain for my black plant, and was disappointed to find that it wears here nothing but dingy greens and yellow. One specimen from the south of the State answers to the description given by Mr. Foerste. The smaller biternate leaf is present, and there is also the third leaf divided once ternately, with only the middle lobe divided ternately again. Besides the terminal panicle of flowers, there is a small panicle in the axil of the third leaf and a larger panicle in the axil of the second.

K. B. CLAYPOLE.

Index to Recent American Botanical Literature.

Acclimatization: Does it occur?—L. H. Bailey, Jr. (Amer. Garden, Sept., Oct., 1887).

The question is discussed at length and examples cited of the wild and cultivated species of the same genus and the differences in altitude and latitude at which they will grow.

Acclimatization in New Zealand.—Geo. M. Thomson. (Science, x, pp. 170, 171).

"English plants chiefly have spread themselves over the country, wherever the settler has gone. It is what Sir Joseph Hooker has called the aggressive Scandinavian flora, which so strongly asserts itself on all sides."

Algæ aus Cuba, Jamaica und Puerto Rico, Ueber einige.—G. Lagerheim. (Botaniska Notiser, 1887, pp. 193-197).

This comprises a list of Desmids with a few descriptions.

Bacteria.—Notes on a few forms of.—Isabel Mulford. (Trans. Vassar Bros. Inst., iv, (1885-1887), pp. 228-241).

Bulletin of the Botanical Department of Jamaica.—Nos. 1-2, April-August, 1887).

These contain articles on *Eragrostis Abyssinica*, Link. (Teff or Thaf), its cultivation and uses. A list of economic and medicinal plants cultivated in the Botanic Gardens; general directions for planting; and a list of sugar canes, with short descriptions of those cultivated in the Gardens.

Chenopodium album.—Cause of the purple coloring of Pigweed leaves. Herbert Osborn. (Science, x, p. 166).

The author finds that the red color which so often occurs on the leaves is due to the larval state of a leaf-hopper, (*Thamnotettix seminudus, Say*).

Chionanthus Virginica, L.—Thomas Meehan. (Proc. Acad. Nat. Sci. Phil., June 21, 1887).

Mr. Meehan notes that diœcism is practically established in this plant, although suppression has not gone as far as to abort either stamens or pistil. The two forms of the latter are figured.

Cladosporium fulvum.—Tomato disease. (Gard. Chron., ii, 1887, p. 532, figs 106, 107).

Development of the Umbellifer Fruit.—J. M. Coulter and J. N. Rose. (Bot. Gaz., xii, p. 237).

Chærophyllum procumbens was selected as a type, as its fruit contains all the structures found in the family. Oil ducts, strengthening cells and undifferentiated parenchyma, each were traced in their development.

Eriogonums, Indicative.—F. W. Anderson. (Bot. Gaz. xii., p. 250).

Green Cotyledons of lemon seeds and Germination inside of the Fruit.—Arthur Hollick. (Proc. Nat. Sci. Assoc. Staten Id., Oct., 1887).

Greeneria fuliginea, nouvelle forme de Rot des fruits de la Vigne, observée en Amérique. F. L. Scribner et Pierre Viala. (Pamphlet, pp. 2).

In the vineyards of North Carolina this fungus has been found on the branches at the insertion of the peduncle at a period between inflorescence and the ripening of the fruit, causing it to dry up.

Hairs of the Peach in relation to Hay Fever.—J. L. Zabriskie. (Journ. N. Y. Micros. Soc., iii., pp. 62-68; illustrated).

Informe preliminar de un Viaje Botanico efectuado por orden de la Academia Nacional de Ciencias en Cordoba, en las provincias de Cordoba, San Luis y Mendoza hasta la frontera de Chili, en los meses de Diciembre, 1885 *á Febrero,* 1886. Frederico Kurtz. (Boletin Acad. Nac. de Ciencias, Cordoba, Repub. Argent., ix, pp. 349-371).

The purpose of this journey was to become acquainted with the Flora of the above provinces of the Argentine Republic and to collect specimens for the herbarium of the University. Over 900 species, illustrated by 4,500 specimens, were obtained.

Introduced plants.—Warren H. Manning. (Vick's Ill. Month. Mag., x, p. 330).

Monotropa uniflora, L.—Wm. Brodie. (Ottawa Nat., i, p. 118.)

Nomenclature of the Eighth Edition of the London Catalogue. Remarks on the.—B. Daydon Jackson. (Journ. Bot., xxv., continued through several numbers).

Out of the long list of corrections we have selected only those for the U. S. which are included in Patterson's Check List.

Sisymbrium Thaliana, Gaud. Antedated by *S. Thalianum*, Gay. Ann. Sci. Nat., vii, (1826) 399;

Lychnis Githago, Scop. (Fl. Carn. Ed. 2, 310, (1772). Not Lam. Encyc., iii, 642 (1789);

Lepigonum versus *Spergularia.* (*Lepigonum*, Fuès Flora Hallandica, p. 76, (1818), in (1819) the brothers Presl. named *Spergularia* (Flora Cechica, p. 94);

Malva borealis, Wallm. in Lilj. Sv. Fl., Ed. 3, (1816.) *M. pusilla*, With. Arr., Ed. 3, ii, 612, (1796);

Melilotus officinalis, Lam. Fl. Fr. ii, 594, (1778); Willd. Enum. ii., 789 (1809);

Potentilla maculata, Pourret. Antedated by *P. rubens*, Vill. Prosp. Fl. Dauph. 46, (1779);

Sedum Rhodiola, DC., Pl. Graisses, t. 143, et Fl. Franc., iv., 386, (1805). Antedated by *S. roseum*, Scop. Fl. Carn. Ed. 2, 326, (1772);

Dipsacus sylvestris, Huds., Fl. Angl., Ed. 1, 49, (1762); Mill. Gard. Dict., Ed. 8, n. 1, (1768);

Antennaria margaritacea, Gaert. Fruct., ii., 410, (1791); Gray, Nat. Arr. ii., 459 (1821); R. Br. Trans. Linn. Soc., xii., (1818);

Petasites vulgaris, Desf. Fl. Atl. ii., 270, (1798), superseded by *P. officinalis*, Moench, Meth., 568, (1794);

Cnicus lanceolatus, Willd. Fl. Ber. Prod. 259, (1787); Hoffm. Fl. Deutsch., 285, (1791);

Vaccinium Oxycoccus, L. is now *Oxycoccus palustris*. Pers. Syn. i., 419, (1805);

Andromeda Polifolia not *polifolia*;

Monotropa Hypopitys, L. *Hypopitys Monotropa*, Crantz. Inst. ii., 467, (1766);

Mertensia maritima, Gray, Nat. Arr. 354, (1821); Don, Gen. Syst. iv., 320, (1837);

Myosotis palustris, Relh. Fl. Cant. 76, (1785). With. Bot. Arr. Ed. 3, ii., 225, (1796);

M. arvensis, Willd., Prod. Fl. Berl. 77, (1787), Roth, (1788), Hoffman, (1791);

Mentha sylvestris, Linn. Sp. Pl. Ed. 2. 804, superseded by *M. longifolia*, Huds. Fl. Angl. Ed. 1, 221, (1762);

Calamintha Nepeta, Link (1809), superseded by *C. parviflora* Lam., Fl. Fr. ii., 396, (1778);

Littorella lacustris, L. Antedated by *L. juncea*, Berg. (1768). Stockh. Hand. p. 341;

Potamogeton rufescens, Schrad. ap. Cham. Adn. ad. Kunth. Fl. Berol. 5, (1815); Wyman & Syme give an earlier name, *P. alpinus*, Balb. (Misc. Bot. i., 13, 1804);

Scirpus carinatus, Gray, (?) Sm. Comp. 10;

Carex teretiuscula, Good., is antedated by *C. diandra*, Schrank, Bot. Ann. 57, (1781), but is not adopted by Pryor, a staunch upholder of priority, he calls it "nomen infaustum;"

C. Lagopina, Wahlb. (1803). *C. approximata*, Hoppe, 1800; *C. bipartita*, Allioni Fl. Pedem. ii., 265, (1785);

C. Buxbaumii, Wahlb. 1803. *C. subulata*, Schum. (1801). *C. polygama*, Schkuhr, Riedgraeser, i., 84. (1801);

C. præcox, Jacq. *C. verna*, Chaix in Vill. Fl. Dauph. i., 312, (1786), concerning which Nyman observes, "nomen anterius sed nunc ambiguum et alterum notissimum;"

Panicum glabrum, Gaud. Agrost i, 22, (1811). "Is not this *P. lineare*, Krock. (Fl. Siles. ii., 95, 1787). *P. Ischæmum* Schreb. in Schweig. 1815?" Mr. Druce;

Leersia oryzoides, Sw. vel. Soland. ap., Sw. Fl. Ind. Occ. 1787;

Alopecurus agrestis, L., preceded by *A. myosuroides*, Huds. Fl. Angl. Ed. i, 23;

Agrostis alba, L. Should this not be *A palustris*, Huds.?

Asplenium Trichomanes, Linn., pp. or Hudson?

Polemonium flavum, Greene. (Bot. Mag., Tab. 6965).

Portulacca oleracea, L. *P. retusa*, Englm. (Science, x, p. 204). With the building of the railroads the purslane has spread westward till it has met the western species, and now the purslane caterpillar, finding them both equally palatable, is traveling eastward at the rate of several hundred miles in one season.

Potentilla.—West American Phases of the Genus. Edward L. Greene. (Pittonia, i, pp. 95-106).

Agreeing with Bentham and Hooker and with Baillon, Prof. Greene places the species of *Horkelia* and *Ivesia* under *Potentilla.* He states fully the reasons which justify this step. *P. elata, P. puberula, P. Clevelandi, P. ciliata and P. Howellii* are new species; *P. Lindleyi* is *Horkelia cuneata*, Lindl., *P. Douglasii* is *Horkelia fusca*, Lindl., *P. Andersonii* is *Horkelia parviflora*, Nutt., *P. Arizonica* is *Ivesia pinnatifida*, Watson, and *P. decipiens* is *Ivesia pygmæa*, Gray, the new specific names being given because the others are preoccupied.

Staining Vegetable Tissues—Notes on.—W. R. Lighton. (Amer. Month. Micros. Journ., viii., pp. 194, 195).

Describes staining living shoots by immersing their cut ends in ordinary colored writing fluids, especially the scarlet and purple.

Taxodium distichum, or Bald Cypress—Notes on the.—N. S. Shaler. (Mem. Mus. Comp. Zoöl. Harvard Coll., xvi., pp. 1-10).

The question of its growth in swampy ground and the object of the peculiar "knees" which it throws out in such localities, as well as its geological history and the adaptation to reproduction in the water by means of rooting twigs rather than seeds are deduced as a series of modifications by which the tree has been enabled to hold its own under unfavorable circumstances.

Ternstroemiaceas, O Tamakoare, Especies novas da ordem das. J. Barboza Rodrigues, (Director of the Botanical Museum of the Amazons). (Pamphlet 4to, pp. 28. Manaos, S.A., 1887.)

This is a monograph of the genus *Caraipa* with five species; *C. palustris, C. silvatica, C. spuria, C. Lacerdaei* and *C. insidiosa*, accompanied by a large plate illustrating *C. rupestris, C. silvatica* and *C. spuria.* Chemical analyses accompany the descriptions and medicinal uses and popular names are given.

Botanical Notes.

Hepatics. We have received a set of "Hepaticæ Americanæ prepared by L. M. Underwood and O. F. Cook," comprising twenty specimens, neatly labelled and put up, representing as many genera. Prof. Underwood says: "We have issued a few numbers of representative, though common plants, in order to bring the price down to a reasonable amount, and to make the sets valuable to beginners in the study. All the orders, typical species of all the larger genera, and illustrations of thallose, incubous and succubous Jungermanniaceæ are therefore included." The price for sets is a dollar and a quarter, postpaid.

Forestry in Europe.—(Reports from the Consuls of the United States, Washington, 1887; 320 pp.). From the table of contents we learn that the subject is treated geographically, including areas under forests, kinds of trees, administration and privileges of, revenues from, destruction and reforesting of forest areas, forest schools, etc.

Mr. C. R. Orcutt, of San Diego, Cal., desires to correspond with any naturalist wishing to undertake exploring and collecting in Southern California, Western Mexico and Central America. He offers to pay expenses, and promises credit and appreciation in the future as a reward.

Contribuzione allo studio del Buxus sempervirens, L. G. A. Barbaglia. (Atti della Societá Toscana di Scienze Naturali, viii., pp. 256-270). This paper is a chemical study of the plant to separate the alkaloids, Bussina, Parabussina, Bussinidina, Parabussinidina and Bussinamina; also a study of the coloring matters and the wax which occurs so abundantly on the upper surface of the leaves.

Sopra un Nuovo Morbo che attacca i Limoni, e sopra alcuni Ifomiceti.—G. Gasperini. (Atti della Societa Toscana di Scienze Naturali, viii, pp. 315-339). This disease of *Citrus Limonum* attacks the fruit when ripe, and in sixty hours completely destroys it. The parenchyma shows threads of a mycelium which has proved sterile thus far, and it has been impossible to determine what fungus or fungi are the cause of the mischief.

The author also studied on the lemon and the orange, *Aspergillus niger* and *A. clavatus*, and describes three species possibly new, *A. violaceo-fuscus*, *A. elegans* and *A. variabilis.*

Sull' inspessimento della parete nelle cellule Liberiane dei piccioli fogliari di alcune Araliacee.—P. Pichi. (Atti della Societá Toscana, viii., p. 455-457, illustrated). On the thickening of the cell walls in the liber of the young leaves of certain Araliaceæ.

Handbook of the Fern-Allies: A Synopsis of the Genera and Species of Equisetaceæ, Lycopodiaceæ, Selaginellaceæ and Rhizocarpeæ. By J. G. Baker; (London: George Bell & Sons, York St., Covent Garden; 8vo, pp. 159). This is essentially the same series already published in the Journal of Botany, but brought together in convenient book form, well indexed and with but few changes in the numbering of the species. It has been much needed, and will be prized as a supplement to the Synopsis Filicum, though we miss a glossary and illustrations of types of groups, such as are found in that work, and which would have added greatly to its value.

Ashes of Flowering Plants, on Aluminium in the. By Hikorokuro Yoshida, F.C.S. (Journ. Coll. Sci., Imp. Univ. of Japan, vol. i, pp. 363-367).

There have been published at least two exceptions to the supposed non-occurrence of aluminium in phanerogamous plants, one in *Rhus vernicifera* (Journ. Chem. Soc., xliii, 481), and the second in the juice of the grape (Comptes Rendus, civ., 853). In the present paper the author gives a table of analyses of peas, beans, rice, wheat, barley, millet and buckwheat, in each of which a small percentage of aluminium has been found, varying from .272 in millet to .053 in the pea (*Soja hispida*).

Proceedings of the Club.

The regular monthly meeting was held at Columbia College, Tuesday evening, Nov. 8th, 1887, the President in the chair and thirty-eight persons present.

Miss Caroline R. Hankey and Mr. Claude Crittenden were elected Active Members.

The committee appointed to prepare resolutions regarding the Herbarium of the United States Department of Agriculture reported as follows:

The committee appointed at the meeting of August 9th, 1887, to prepare an expression of opinion for the Club relative to the Herbarium of the Department of Agriculture at Washington, reported the following:

The TORREY BOTANICAL CLUB, realizing the importance that the Government of the United States should possess, on behalf of botanical science, a complete collection of native plants growing within its limits, for the benefit of those both from home and abroad seeking knowledge in that department of science, respectfully presents the following preamble and resolutions :

Whereas, It has been represented to this Club that the botanical collections of the United States Department of Agriculture are incomplete as regards the representation of many species of North American plants and their products, and

Whereas, It is necessary for the successful prosecution of botanical investigation by officers of the Department, or by others who may desire to consult the collections, that these should be made as complete as possible in species, varieties and forms of American plants, and

Whereas, The greater portion of the desiderata of the Herbarium can be procured by purchase or by the systematic employment of collectors in different portions of our territory at trifling expense as compared with the enduring value of such outlay :

Resolved, That the TORREY BOTANICAL CLUB respectfully represents these facts to the honorable Commissioner of Agriculture, with the request that he give them the attention the subject demands, and in the hope that he may be enabled to secure such appropriations as will soon place this National Herbarium in its proper position at the head of American botanical collections.

THOS. HOGG,
N. L. BRITTON,
JOS. SCHRENK,
Committee.

The following letter was received from the Audubon Monument Committee of the New York Academy of Sciences :

To the Secretary of the Torrey Botanical Club :

DEAR SIR : The New York Academy of Sciences proposes to erect a monument over the grave of Audubon, in Trinity Church Cemetery, New York city, which shall be worthy the memory of America's greatest ornithologist. It is estimated that from $6,000 to $10,000 will be required.

The Academy desires to enlist in this undertaking the co-operation of its corresponding associations in all parts of America, that the enterprise shall not be confined to New York, but shall represent the sentiment of all.

The Committee respectfully requests that you bring the matter to the attention of your Club at its next meeting, and suggests the appointment of an officer or a committee to solicit and collect funds, and with power to co-operate with this Committee in any other way that may seem desirable.

Checks should be made payable to the undersigned and post-office orders drawn on Station H, New York city. All remittances will be promptly acknowledged and recorded in the Transactions of the Academy.

Very respectfully, N. L. BRITTON,
Secretary and Treasurer.

On motion and carried, the President appointed Prof. J. A. Allen and Mr. E. P. Bicknell such committee.

Rev. Dr. Geo. E. Post, of Beirut, Syria, then addressed the Club on " The Flora of Syria and Palestine." He remarked that the physical geography of the region was most varied, its most marked feature being a deep valley, trending from Syria on the north to the Gulf of Arabah on the south, and enclosing the main river systems, viz., the Orontes, the Leontes, and the Jordan, with Lake Chilowith and the Dead Sea. The northern portion of this valley is quite shallow, the Orontes flowing out through a gorge to the Mediterranean Sea; the Leontes also flows out through a rocky barrier. Both these rivers rise in an ancient lake-bed, the former flowing north, the latter south; the Jordan, flowing south, empties into the Dead Sea at a depression of 1,294 feet below the Mediterranean. The speaker suggested that this whole valley may have originated in a fault.

This valley is enclosed to the west by the Messire and Lebanon Mts. of Syria, the latter 10,000 to 12,000 feet high, followed to the south by the table-land of Palestine. To the east it is bounded by Anti-Lebanon on the north, and the mountains of Gilead and Moab to the south. All these mountains, with the exception of some outlying spurs of Anti-Lebanon, are of limestone of Cretaceous age.

The region to the east is mainly volcanic. The Bashan Mts. are forty miles east of the Jordan, and from three peaks just north of these a large lava-flow has spread in triangular form towards the west.

This structure of the country has influenced the distribution of plants to a very marked degree. Dr. Post had recognized the following floral belts:

(1.) *The Coast Plain*, a narrow strip bordering the Mediterranean, and having the ordinary plants of other shores of that sea, its flora being the least specialized of any.

(2.) *The Coast Range of Mountains, to about* 4,000 *feet altitude*, whose flora has strong analogies with the mountains of Greece and Asia Minor, Cyprus and Crete.

(3.) *The Alpine and Sub-Alpine Regions.* These have a highly specialized flora, whose most marked feature is the great abundance of spiny species of *Astragalus*, *Onobrychis*, etc.; *Acantholemon*, which forms domes of awl-shaped foliage two or three feet in diameter, and *Erodium tripomaniæfolium.* The goats devour everything not protected by spines. The great growth of Cedars is near the northern end of the Lebanon Mts. Dr. Post had also seen them in the range to the north called Amanus ; there are none in the hill country of Palestine, and none reported from Anti-Lebanon. They now grow in Cyprus, and were formerly in the Taurus Range. The largest seen by Dr. Post were 42 feet in circumference.

(4.) *The Valley.* The flora of this deep cleft resembles that of Nubia; only a few species are peculiar. The Dead Sea is surrounded by very high mountains, and appears to contain no life of any kind. Dr. Post had not observed even Algæ.

(5.) *The Deserts*, whose flora is quite similar to that of neighboring deserts.

(6.) *The Great Interior Plain*, whose flora is very different from any west of the mountains, and very highly specialized. This stretches eastward to the Euphrates.

Dr. Post stated that the whole territory under consideration was not larger than the State of New York, yet 3,500 Phanerogams occurred, against some 1,800 in New York. There are only 20 ferns. The largest natural order is Leguminosæ, next Compositæ, and next Umbelliferæ. Dr. Post has two papers in preparation on undescribed plants from Syria, which will be published in the Reports of the Palestine Exploration Fund and the Victoria Institute of London.

Mr. R. Demcker exhibited a remarkably perfect spadix of *Cocos nucifera*, and a large woody fruit probably of a species of *Lecythis*, from the Isthmus of Panama.

Mr. Hogg distributed specimens of white-flowered *Cnicus lanceolatus*, and *Lechea major*, *L. minor* and *L. maritima*, from Eaton's Neck, Long Island.

Dr. Newberry remarked on the best kinds of fruits now in market, and distributed a variety of Apples, Pears, Grapes and Persimmons. He stated that many varieties of the Japanese *Diospyros Kaki* were now cultivated in Florida and California. Some of those exhibited were as large as and of much the shape of a Tomato.

Mr. Hogg said that the large oblong persimmon shown was dried and packed by the Japanese for export. This variety has very long seeds.